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An Amador County Stamp Mill.

The illustrations on this page are typical views of mill and water ditches of a California mine, and are such as may be seen in any mining region. The location is near Amador City, Amador county, and the properties are the Mayflower and South Mayflower (formerly the Bunker Hill). The history of these properties is interesting. They have been great producers in the past, and it is gratifying to know that an effort is being made to place them again in the list of paying mines. After many years of active operation these properties in 1880 passed into the hands of the Spring Garden National Bank of Philadelphia. Several years since the bank failed and the properties went into the hands of the receiver. Operations stopped and the mines were allowed to fill with water. May 1, 1893, the mines were leased to Dr. Stephen H. Emmens, who has transferred them to the present owning company, the Mayflower Gold Mine, which in turn has granted a lease (with leave of purchase) of the Bunker Hill claim to the Chicago Gold Mining Syndicate. The Mayflower has already paid a dividend to the new company. Work on the South Mayflower is rapidly progressing.

The mill shown in the cut contains 40 stamps and 16 concentrators. It is run by a six-foot Knight wheel, supplied with water by means of a pipe from the water company's ditch. It is also provided with ample steam-power for use in the event of the water supply running short at any time. Having regard to the period of its erection, and to its enforced idleness for two years prior to the recent resumption of work, the buildings and machinery are in fair condition. Ten stamps have been put in repair and are running satisfactorily; and the work of repairing a second



A WATER-POWER DITCH IN AMADOR COUNTY.

battery of 10 stamps is under way. The remaining 20 stamps can be speedily made serviceable immediately the mining developments shall open up an adequate supply of ore. The chlorination works will be placed in condition for roasting and reduction.

The arrangements for handling the ore are good. The mineral is automatically dumped from the skip at the mouth of the shaft into cars which descend to the mill by a self-acting gravity incline and discharge into rock breakers. The ore is not handled from the time it leaves the mine until it passes away as tailings into the Rancheria creek. The assay of the tailings rarely goes higher than 50 cents per ton, thus showing a very high milling efficiency. At the point in the upper cut indicated by the cross, it is proposed to sink a new shaft on the Mayflower.



FORTY-STAMP MILL ON RANCHERIA CREEK, AMADOR COUNTY.

JOHN H. HOBART of Oakland is the inventor and patentee of a process of saving "flour" gold from slimes and whatever escapes a mill. The device has recently been in operation at the Harmony (gravel) mill, Nevada county, and is claimed to have saved not less than two ounces of amalgam per day, and in 20 days 47½ ounces. As described in the *Herald*, the device consists of a closed box about the size of a butter box, and is set up at an angle of about 45 degrees. The water bearing the slimes from the mill passes over a plate and into the box, which is divided into three compartments. It runs onto a plate which is bent at right angles and is covered with a screen; striking the plate at one edge and running down, thence back to the rear edge, thence to the bottom of the box; running onto the second screen, and finally the third. The bottom of the box is covered with plates. The box has a lid which fits tightly, and three plates are fastened to the lid so that when closed they hang in the water, and between the three compartments. These are intended to catch the flour gold floating on the surface of the water. The device is to be used also at the Champion quartz mine.

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The Midwinter Fair was informally opened January 1st. It will probably be February 1st before the formal opening can take place.

The Debris Commission held a meeting January 2d. Licenses were issued to Joseph Davis, Manuel Mateos and Frank Barbero to work three small placer mines in Howard Creek, near Sierra City. The following mines were authorized to build dams: The Red Hill, Badger and Walker mines, near Ono, Shasta county; the Tannery mine, near Brownville, Yuba county; and the North Star and Green Mountain mines at Mokelumne Hill, Calaveras county. The Fifty-four Flat mine, near Volcano, Amador City, was authorized to submit a plan for a dam.

The determination of the problem of the amount of water to be used for irrigation in the West is the object of investigation now in progress at the geological survey. The scientists of the survey have completed a chart showing the "mean annual run-off in the streams of the United States." It was compiled under the direction of Geologist F. H. Nowell, and is the first map of its character ever made. It is the result of about fourteen years' study, though only since six years ago has the investigation been conducted on an extensive scale. During the past six years all large rivers in the country have been gauged by survey scientists.

The intimate relation between mining and agriculture has been conspicuously shown in Idaho and eastern Washington during the past year. The great Oeur d'Alene district has always depended upon the Palouse country for its produce, and it is a fact that never until this year have the farmers been able to supply the demand for fruit and vegetables, butter, eggs, etc. Now the farmers have no market for these things and their distress is great. Exactly the same experience has been undergone in California. When the hydraulic mines shut down, the farmers near the mines were, next to the miners, the greatest sufferers. There was no sufficient demand for their products. The want has not yet been cured.

MR. GEORGE E. MILLS, a California mining man, who has just returned from a several years' stay in the East, writes to the PRESS relative to the deplorable condition of the iron-mining industry in New York and Pennsylvania. Iron furnaces, rolling-mills, wrought-iron pipe mills, steel-converting mills, iron and coal mines, and nearly all the coke-furnaces, he says, are idle. Thousands of men are out of employment and know not where to go or which way to turn. "I have never," says Mr. Mills, "seen such idleness and dull times in this country." Mr. Mills has been at work on the machinery of the Melton gold mine, El Dorado county, which has been idle for four years, and which has suffered much from decay. It will soon be in running order.

Gold and Silver in 1893.

Reports of the mineral output of 1893 are already beginning to come in, Colorado, Idaho, Utah, and Nevada, having already been heard from in whole or in part. Of course there has been a heavy falling off in the silver output. The gold by-product has been seriously affected by the shutting down of the silver mines, but on the whole, it is probable that the increase in the gold mines proper will more than offset the difference. The first returns in are from Wells, Fargo & Co., from whom we have Idaho and Utah. A statement of Colorado's output has been prepared by a committee of business men.

Colorado.—The committee's report shows an increase in the gold production from \$3,636,217 in 1889 to \$5,539,021 for 1892, and calls attention to the great gold developments of the Cripple Creek region, where experts claim there is enough low-grade ore in sight to yield \$100,000,000. Leadville promises to rival Cripple Creek as a gold-producing camp, one mine yielding \$5000 per day. The gold output of Colorado in 1893 is estimated at \$8,300,000. Statistics are also given of the production of coal, coke, granite, petroleum and agricultural products, showing great prosperity and abundant resources.

Idaho.—The figures of Idaho's metal production for 1893 prepared by Alfred Oefs, cashier of the Boise City National Bank, for Wells, Fargo & Co., are as follows: Gold, \$1,645,000; silver, \$1,502,000; lead, \$775,000; total, \$3,922,000.

The figures last year were: Gold, \$1,790,000; silver, \$2,798,000; lead, \$2,475,000; total, \$7,063,000.

The decrease for the year is largely in the Oeur d'Alene where the mines have been closed down most of the time. The production of that section last year, under adverse conditions, was \$3,438,500, while for the year just closing it was only \$1,375,000. The closing of mines carrying silver mainly, with some gold, largely reduced the gold production, but it has been compensated for by the opening up of placer mining in new localities which had not heretofore been considered worth working.

Utah.—Wells, Fargo & Co.'s statement of the mineral product of Utah for 1893 shows a total of 94,072 ounces of fine gold, 7,107,503 ounces of fine silver, 1,062,467 pounds of copper and 70,097,079 pounds of unrefined lead.

The gold is reckoned at \$20 per ounce, and silver at 80.64 cents per ounce, copper at 6½ cents per pound and unrefined lead \$44 per ton, which makes the total export value \$7,926,601.28. Computing the gold and silver at mint value and the other metals at their value at the seaboard it would increase the value of the product to \$12,832,074.88.

In 1892 Utah produced metals as follows, according to Wells, Fargo & Co.'s statement: Gold, 38,182 ounces; silver, 8,969,656 ounces; unrefined lead, 91,117,107 ounces; copper, 1,822,616 pounds.

The Comstock.—The total ore product of the Comstock lode during the first three-quarters of the year 1893 was 46,365 tons. The bullion yield of this ore was \$683,162; total cost of extraction, transportation and reduction foot up \$955,606, according to the sworn statements of mine superintendents. The returns from the Savage include only the first quarter of 1893 and the Hale & Norcross has made no statement. The yield of the lode was divided as follows among the ore producing mines:

Consolidated California & Virginia ore yield, 14,347 tons; gross bullion product, \$261,895; cost of extraction, \$209,964; cost of reduction, \$73,522; total cost, \$276,018.

Savage.—(First quarter ended March 31) Ore yield, 4,672 tons; gross bullion product, \$73,163; cost of extraction, \$50,835; cost of reduction, \$28,035; total cost, \$78,871.

Kentuck.—Ore yield, 2,183 tons; gross bullion product, \$14,859; cost of extraction, \$11,439; cost of reduction, \$5,125; total cost, \$18,767.

Potosi.—Ore yield, 17,579 tons; gross bullion product, \$254,143; cost of extraction, \$157,890; cost of reduction, \$105,574; total cost, \$263,364.

Challenge.—Ore yield, 221 tons; gross bullion product, \$4,801; cost of extraction, \$6,522; cost of reduction, \$2,111; total cost, \$9,066.

Justice.—Ore yield, 1,229 tons; gross bullion product, \$15,029; cost of extraction, \$16,822; cost of reduction, \$7,680; total cost, \$24,482.

Crown Point.—Ore yield, 1,430 tons; gross bullion product, \$12,380; cost of extraction, \$35,693; cost of reduction, \$6,818; total cost, \$42,473.

Overman.—Ore yield, 813 tons; gross bullion product, \$9,063; cost of extraction, \$16,331; cost of reduction, \$4,068; total cost, \$20,567.

Confidence.—Ore yield, 268 tons; gross bullion product, \$3,173; cost of extraction, \$1,299; total cost, \$6,065.

Yellow Jacket.—Ore yield, 5,821 tons; gross bullion product, \$58,548; cost of extraction, \$85,333; cost of reduction, \$25,516; total cost, \$116,328.

Belcher.—Ore yield, 2,230 tons; gross bullion product, \$53,573; cost of extraction, \$30,765; cost of reduction, \$11,160; total cost, \$94,156.

Imperial.—Ore yield, 151 tons; gross bullion product, \$1,634; cost of extraction, \$1,323; cost of reduction, \$757; total cost, \$2,232.

When the statement of the last quarter is received it will probably swell the total bullion yield for the year 1893 to \$800,000, according to the estimate of the *Territorial Enterprise*. This is a marked falling off below the product of any year since 1884. Of the total bullion yield last year nearly \$300,000 was in gold. As a majority of

the other mining districts in Nevada are largely silver producing, and as the extraction of ore has been almost totally suspended since the depression in the price of bar silver, the entire bullion yield of the State for 1893 may not exceed \$3,000,000 against over \$6,000,000 for the year 1892.

Mineral Product of United States for 1892.

The report on the mining resources of the country, prepared by Chief Day of the division of mining statistics of the geological survey, and forwarded by telegraph from Washington January 31, shows that the high-water mark in mineral productions was reached in 1892, both in this and every other country. The total value of all the mineral products in that year was \$684,778,768. This is \$20,000,000 greater than for any previous year.

Among the large gains was \$77,130 tons pig iron, with an aggregate product of 9,157,000 tons, valued at \$131,161,039.

Gold showed a slight loss in the year's product, valued at \$33,000,000. There were 1,596,375 ounces.

The total production of silver was 58,000,000 ounces; coinage valuation, \$74,989,000. The amount is an increase of 877,130 ounces for the year. The increased valuation of the product for the year is \$2,821,054.

Copper gained 57,465,666 pounds, making an aggregate of 853,275,742 pounds, of the value of \$37,677,142.

Lead gained 10,856 tons, aggregating 213,262 tons, valued at \$17,061,950. There was a loss of 7000 tons in zinc. Aluminum was almost doubled. The year's product of zinc aggregated 87,260 tons, valued at \$8,027,920. Quicksilver, 27,993 flasks, valued at \$1,245,689. Tin from the mines of California, 160,000 pounds, and an aggregate for the year of 162,000 pounds, valued at \$32,400. Nickel, 92,252 pounds, valued at \$50,739. Aluminum, 359,885 pounds, valued at \$173,824.

Bituminous coal increased 3,000,000 tons, giving a total of 113,237,845 tons, valued at \$125,195,139. Petroleum is declining rapidly. In 1891 there were 54,000,000 barrels produced, but there were only 50,509,136, valued at \$26,034,196, in 1893.

Natural gas is also falling off, both in quantity and value. Its high-water mark was reached in 1888, when the product was valued at \$22,629,875.

Quantities and values of other non-metallic products produced during the year were as follows: Building stone, valued at \$48,706,625; lime, 65,000,000 barrels, valued at \$40,000,000; natural gas, valued at \$14,800,714; cement, 8,753,620 barrels, valued at \$7,152,750; salt, 11,698,890 barrels, valued at \$5,654,915; phosphate rock, 681,581 tons, valued at \$3,295,227; limestone for iron flux, 5,172,114 tons, valued at \$3,620,480; mineral waters, 21,876,604 gallons, valued at \$4,905,970; zinc white, 27,500 tons, valued at \$2,200,000; potter's clay, 420,000 tons, valued at \$1,000,000.

The total value of metallic minerals for the year is \$803,775,729; non-metallic, 871,003,109; unspecified minerals, \$10,000,000.

The report reviews in detail the use of aluminum, and states the principal use of the new metal in future will be in cooking utensils.

The use of the principal minerals in the first six months of last year was also reviewed, showing a great decline in the production, as anticipated from the general monetary depression.

The reader has, of course, not failed to observe that these figures are for 1892, not 1893. There can be no doubt that during the year just past, the mineral production of the United States has fallen off heavily. Silver, lead, copper, coal and iron will show a heavy falling off. There will probably be a decrease in quicksilver. Gold will hold its own, but will show an increase in California.

The announcement is made that J. W. Grace & Co. have arranged to put a line of tank steamers between this city and Peru for the purpose of conveying to this market the output of the Peruvian petroleum fields. The steamer Bawnmore has already been chartered for that purpose. It is said that the Bawnmore's cargo has already been sold to the San Francisco Gaslight Company for \$2.75 per barrel—the prevailing rate being \$3.50. The petroleum interest in California is large, the State standing fifth in the United States in rank of production. The output is extensively used for fuel purposes. The entrance into this market of the Peruvian product is of importance therefore to coal producers as well as petroleum. The high price of the former has to a considerable extent assisted the demand for the latter. The California wells have not in the past been troubled with direct competition, the high freight rates shutting the producers of the East and Colorado from this field. But if Grace & Co. are able to carry out their promises a very lively fight may be expected.

Important Mining Deal.

The Good Hope Consolidated Mining Company has just sold all its property in the Pinacate district, Riverside county, to Dudley Porter, John L. Hobson and Charles W. Morse, of Haverhill, Mass., for \$500,000—making altogether the largest transaction in California properties which has been recorded for some time. Colonel John M. S. Eagan of Georgetown, Col., manager of the Pay Rock mine near that city, is to have the management of the mines. One of the purchasers, Charles W. Morse, of Haverhill, Mass., who is in Riverside, says he will leave Sunday for San Francisco to purchase a stamp mill, mining tools, etc., to push the work. Colonel Eagan accompanies him, and will return to Colorado for his family and bring them to Riverside. The Good Hope mine was the first in the Pinacate district to reach a paying basis—and that it has paid well is evidenced by the sum realized for it and adjoining properties.

The peculiarities of the Pinacate district are such that they are worth noting in this connection. The veins of the Good Hope mine are in a dyke of light-colored biotite granite. It has considerable width on the surface—100 feet or more—but below ground some distance it is not over 12 feet. On the surface it is greatly decomposed and cut by numerous small veins, which are so scattered that they hardly pay for working. Below they unite to form larger veins, generally one on the foot and another nearer the hanging wall. The latter is more irregular, often running out at a small angle. The foot-wall, a dark, compact diorite, is very regular. The walls are separated by well-defined seams from the vein matter, the decomposed granite. Clay seams also separate the different veins. The foot-wall diorite forms the country rock indefinitely eastward. The hanging wall is a fine, dark brown mica schist. The quartz is generally friable, and the granite vein matter much decomposed. The quartz at a depth of 300 feet carried one-third of the gold in the sulphurets. A small amount of silver is also found. This vein is located for over a mile; direction a little east of north, dip 65° west. It is remarkable that there is no barren quartz; all the ore pays for working. In the lower workings the veins become more regular.

The sale of these mines is ample proof that there are good mines in California for sale. The recent offer of \$200,000 for the Nevada City mine is another. The purchase of the Rocky Bar and other Massachusetts Hill mines by James D. Hague is one more. The sale of the Alison Ranch, at a figure said to be large, is still another. The sale of the Hite mine, in Mariposa, is another. And so on the list might be multiplied indefinitely. The list of mines of what might be termed the second class (based on output) which has recently changed hands is very large. The organization of new mining companies—recorded in this paper from week to week—exceeds in number the record for many years. Some of these companies are organized to develop new, others to re-develop old properties. Their promoters seem to have had no unusual trouble in finding desirable properties. Where there is money to buy it will be found that there is a corresponding willingness to sell mines. If a purchaser thinks a figure exorbitant, he must act precisely as he would in any other transaction—refuse to buy. There are other properties. If an owner considers an offer too low—and he often does—he has the privilege of declining to sell. But, in the course of business, a common level is to be found. We believe that there is at this time no legitimate investment in the United States which offers such guaranties of profitable returns as a California gold mine. Capitalists appear to be coming to much the same conclusion.

THE De Lamar mines in Idaho have been operated steadily during the financial depression and have paid large dividends. The proportion of gold to silver produced is about 55 to 45, the former predominating. The ore, on account of the finely granulated condition and the softness generally of its porphyritic surroundings, submits readily to rapid crushing, three and a half to four tons per stamp being readily worked in 24 hours. The amount crushed per month is about 3500 tons. The amount shipped to smelters is valued at \$8000 to \$10,000 per month. The report of production by Captain Plummer, the manager, is: *Tons Crushed Dry.*—To March 31, 1892, 19,390; to March 31, 1893, 26,853.66; to Nov. 30, 1893, 22,387.85; total, 68,631.51. *Number of Ounces Pure Gold Produced.*—To March 31, 1892, 13,143.410; to March 31, 1893, 19,023.667; to Nov. 30, 1893, 16,581.424; total, 48,748.500. *Number of Ounces of Fine Silver Produced.*—To March 31, 1892, 317,112.59; to March 31, 1893, 487,137.74; to Nov. 30, 1893, 349,785.76; total, 1,154,036.09. The number of men employed in the mine in every department amounts to 175. The amount of dividends paid to date amounts to \$1,000,000. The amount of dividends paid for 1893 amounts to \$340,000.

The Quicksilver Outlook.

The executive committee of the California Quicksilver Mining Company has signed for another year the agreement that the Enreka Mining Company shall be its sole agent. Mr. George Staacke is the secretary of the company. There was no question raised at the meeting of the committee about shutting down the mines, but the advisability of lessening the production for some time will soon come up, and will probably be settled in the affirmative.

There has lately been an increased consumption of quicksilver among the electrical companies in the East, and a shipment of about 3000 flasks has been made to China, the first to that country for many years. In spite of this, however, the price of quicksilver has gone down, and several reasons have been given therefore.

The California mines produce as much quicksilver as can be used on the whole Pacific coast in the United States. The old Almaden mine in Spain produces 50,000 flasks a year; the Idria in Austria produces about 16,000 flasks, and this amount is increased from other mines in other countries. The European production has not materially increased, but the quicksilver mines on this coast are a unit in objecting to any reduction of the present duty of ten cents a pound.

"The export to foreign markets is about as usual," said a gentleman connected with Newhall & Co. to a *Call* reporter, "but the amount used in this country has shown considerable decrease since the closing of the silver mines in consequence of the anti-silver legislation. For one flask used in gold mining a great many were used in silver mining, and in the former case the large proportion can be saved, while in the latter but little was preserved. When silver stands at 68 cents an ounce, not one mine in twenty-five pays to work. That's the reason of the reduction of price, and at the present quotations I think only about five quicksilver mines could be worked with any profit."

The conditions which have brought about a disturbance in the local market, it is believed, will soon be removed, and matters will assume something like their former tone. The chief source of uneasiness on the part of quicksilver men is the prospective removal of the tariff duty of ten cents per pound (\$7.65 per flask). There is no reason why returning wheat vessels cannot bring from Spain or England to this port large quantities of quicksilver. The average difference in London and San Francisco prices of quicksilver is about \$7 per flask. It is certain that quicksilver can be brought to this city from London at 25 cents per flask, leaving importations from Spain out of the question. The inevitable consequence will be to bring San Francisco prices down to the level of London prices. From the standpoint of the consumer there will be no objection to this reduction; but from the producer there will be most serious opposition, for the plain reason that it means ruin to the industry in California. If the California mines are once shut down by reason of such competition, there is ample reason to expect that the price of quicksilver will rise, and the consumer will secure no lasting benefit. It will be raised because the Spanish mines are controlled by a great syndicate, which will be enabled to manipulate prices to suit its own convenience. It cannot be doubted that it will make the most of its opportunities.

A PRESS DISPATCH from Boise City says: An interesting fact developed that Idaho distanced all competitors at the World's Fair in the mining department in a smelter test after the fair closed. There was sharp rivalry over smelter returns from the ores sold. New Mexico led off with 50 ounces of silver and 10 per cent lead. Utah got \$300 for six tons, and Montana got \$800 for 16 tons. Then Idaho came in with \$1290 for 16 tons, the returns being 1.48 ounces gold per ton, 73.6 ounces silver and 49.47 per cent lead. The remaining States refused to try to match it. New South Wales admitted that their ore could not match it. Washington people gave their ore away, and Colorado did likewise. The 5200-pound chunk of Bunker Hill and Sullivan galena was purchased by the American Association of exhibitors, to be exhibited at Antwerp. Idaho has received 17 medals, awarded in the mining department.

It is not wise for prospectors and miners to become unduly excited over the fabulous reports which have come from the Goler and other districts in the Mojave desert. It is no doubt true that there is gold in these districts, and probably a good deal of it; but it is likewise true that the available placer territory is to a considerable extent appropriated. The disadvantages of existence in such a region should be considered by all who contemplate going there. It is dry, remote, difficult of access, and supplies are expensive. One who goes in must be prepared to undergo more or less hardship. There are, no doubt, some who will secure fine claims; the majority run good chances of coming out empty-handed.

Sliokens.

There is a movement on foot in Spokane to establish ore sampling works.

THE Last Chance mine, Hoopa valley, Humboldt county, is about to be sold to Richard Phelan, B. M. Lawrence, Albert Backman and J. A. Ryden.

THE Nevada City *Transcript* says the Good Hope and Lone Jack mines, at the Cabbage Patch, near Spenceville, were sold Saturday to J. V. Brooks of Kentucky, for \$60,000.

At an extraordinary general meeting of the Golden Gate Alluvial Syndicate, held at its offices in London, resolutions of reconstruction were unanimously confirmed. The company will henceforth be known as the "Golden Gate of California (Limited)."

THE Southern Cross Mining Company has been incorporated. Principal place of business, Oakland. Capital stock, \$750,000, with E. L. Ford and William Bentley, of Towles, Placer county, and E. W. Harlow, W. H. Mac and James H. Swift as directors.

It is reported authoritatively that the management and superintendency of the Baisley-Elkhorn mine at Baker City, Or., has been tendered by the directors of the Baisley-Elkhorn Mining Company to Mr. I. K. Farrel, manager of the Oregon Gold Mining Company at Cornucopia.

A LOCAL paper states that the "gold output of Colorado for 1893 is estimated at \$83,000,000, and in 1894 it will probably exceed this by \$20,000,000." All of which shows how easy it is to multiply figures. The total gold output in the United States for the past two years has not been so much.

THE Gold Bar Mining Company, at Vanderbilt, has been incorporated under the name of the Vanderbilt Mining and Milling Company. The incorporators are J. K. Patton, Anna M. Taggart, William Chambers, H. C. Dillon and S. F. Godbe. The capital stock, paid in, is one million dollars.

TEN FEET of shipping ore that runs 97 ounces in silver and 79 per cent lead has been struck at Ainsworth in the Slocan district. The find was made in crosscutting on the joint tunnel of the Little Donald and Little Phil. It is one of the most valuable discoveries in the northern mining country for a long time past.

RETURNING prospectors from South Africa report that in Mashonaland their pursuit is so hampered by undesirable conditions as to make it unprofitable. It is necessary to obtain the permission of the British South African Company before prospecting can be undertaken, and then, if successful, heavy royalties must be paid.

At the rate at which mining locations are being filed in this county, one would think that the mines would soon be encroaching upon the orchards, and these two industries become rivals for the possession of the land, says the San Jacinto (Riverside county) *Register*. Fortunately the two have not yet come into collision, and as the mere matter of unoccupied land has little to do with the progress of either of them, they are not likely to interfere with each other.

THE Silver Peak Mining Company, recently organized in this city, has purchased 20 locations in the Silver Peak district, Esmeralda county, Nev. The plans of the incorporation include the construction of a 150-stamp mill which it is expected to have in running order about the middle of next July. The ore in Silver Peak district is exclusively gold-bearing and there are numerous locations there being developed by miners on a small scale, who receive a good return for their labor.

E. J. POWELL, who has invented a process of saving gold from base ore, says the *Placer Republican*, has just constructed a machine designed after his system, and will give it a trial in a few days at one of the Ophir mills. He will try it on ore from the Gold Blossom mine, and if it proves a success Mr. Powell's fortune will be made. Those who have examined the model express great faith in its underlying principle, and the trial will be watched with interest.

A DISPATCH from Washington says the Geological Survey, in its work of publishing topographic and geologic maps of the entire country, has recently finished a number of different parts of California. With the maps is given much in the way of description that will be of inestimable value to those engaged in mining industries. The whole State of California has not yet been completed, but it is stated that most of the maps, particularly those relating to mines and mining, have been issued.

A SAN FRANCISCO paper of last Friday (Dec. 22) contained a long and startling account of an outbreak by the Hnachu Indians at San Carlos, Ariz. Many persons were reported killed and horrors committed. James M. Caw and E. S. Irwin, two mining men, have just returned from that part of Arizona, and they pronounce the statements false from beginning to end. There was no outbreak or expectation of outbreak. Such reports are designed to hurt a Territory as orderly as any in the West, and ought not to be printed unless they are known to be reliable.

IT TRANSPIRES that E. W. Fleming, who went to the World's Fair in the interest of the Idaho opal fields, worked something of a swindle. He agreed to send the people opals for a small sum to cover the cost of cutting, the charge being \$2. The stones were sent C. O. D. and he disappeared soon after the fair closed, and from a multitude of letters since received it appears that he sent bogus opals to a great many people. It is learned that he was recognized by the World's Fair people from California as E. M. Pennington, wanted in this State for swindling farmers by selling them common cactus plants for what he claimed to be hedge cactos. He went to Idaho in 1891, working a cactus scheme of some kind.

THE long and serious war dispute between the managers and miners at Northfield colliery, Nansaimo, B. C., has at last been adjusted, the men agreeing to accept a reduction equal to 15½ per cent, and the management making slight concessions with regard to handling dirt. It will be remembered that a strike occurred some months since, and that the miners agreed to return to work under a provisional arrangement until January 1st. The miners favored a settlement by arbitration, and the other day sent a committee to the management to notify them to that effect. The superintendent was unwilling to arbitrate, and for a time it appeared as if the men would decide in favor of a general strike. Finally cooler counsel prevailed, and a committee was appointed to again wait upon the superintendent and endeavor to arrange better terms.

The Wilson Bill and Its Chances.

It is announced from Washington that the Wilson bill is certain to pass both houses with no material changes—none at all affecting the general policy of the bill. It is possible, it is said, that some slight concessions to local interests will be made in committee, but no amendment will be suffered on the floor of either house. It is designed to railroad the measure through in exactly the same manner as the McKinley bill.

Of course the main fight will be in the Senate, where the Democratic majority is not so great as in the House. It is unfortunate for several of the great interests of the West—notably silver, lead and lumber—that three of its States—Washington, Montana and Wyoming—have each only one Senator. It may be assumed that they would make a strong fight against those features of the bill placing lumber on the free list and reducing the lead duty. As it is, the issue in the Senate is somewhat uncertain, notwithstanding the confident declaration that the bill will pass. The Democratic majority is not large, and there is some hope that several of the Southern Senators whose State interests are vitally affected, will vote against the measure.

The Western representatives in the Senate will of course oppose the measure, because their State interests are concerned, and for the no less important reason that all, with one exception, belong to parties different from that in power. From the mining States there is just one Democrat—White of California—and he will probably go with his party. It may be admitted that the chances of passage of the bill seem better than the chances of its defeat; but for all that the lead-silver miners and the lumbermen do not propose to be idle. The issue is of the most momentous consequence to them, and they propose to use every possible effort in their own behalf.

To Coin Silver Bullion.

Representative Oates of Alabama has introduced the following important bill to provide for the coinage of silver bullion now owned by the United States:

SECTION 1.—All silver bullion now owned by the United States shall be coined as speedily as practicable into standard silver dollars of the weight and fineness as now prescribed by law, which shall be legal tender in payment for all debts, public and private; *provided*, one-seventh part of said bullion may be coined into half dollars, quarter dollars and dimes in proportion directed by the Secretary of the Treasury and to contain the amounts of pure silver and alloy as now prescribed by law for such coinage.

Sec. 2. The Secretary of the Treasury shall set apart \$40,000,000, coined as aforesaid, for the redemption of notes issued by the Treasury and paid out for the purchase of silver bullion in the manner provided in the act of July 14, 1890, and whenever said sum is reduced below \$40,000,000 by the redemption of said notes the Secretary shall, from any other silver dollars in the Treasury not otherwise appropriated, add to the said sum so as to keep it up to the \$40,000,000, until the aggregate amount of said notes outstanding is reduced below that sum, and then the Secretary shall keep in the Treasury for redemption an amount of silver dollars equal to the amount of notes outstanding, until all are redeemed; *provided*, the Secretary may re-issue any of said notes when redeemed, as provided in the act of July 14, 1890.

Sec. 3. Any contract hereafter made by the Government of the United States, or between corporations, or between a corporation and a person or persons, or between private persons, which is by its terms or law payable in dollars or dollars and cents, may be paid at its maturity or thereafter in any lawful coin of the United States.

ADVICES from Pioche, Nev., are that Samuel T. Godbe has sold to Denver people the Monitor and Jim Crow properties, in Ferguson district, for \$450,000. The PRESS of December 9 contained an account of the transaction by which Mr. Godbe secured a bond on the mines. By its terms D. A. Reeves, A. C. Ellis and Frank Wilson parted with the Monitor, Monitor Dump, west half of the Cliff, the Princess, seven-eighths of the Lucky Bar and three-fourths of the Millionaire claims—on a basis of \$300,000, it is said. Messrs. Nesbitt Bros. and Mrs. J. McFadden list seven-eighths of the Jim Crow claim on a reported basis of \$150,000. The value of the properties is undoubted, though the real consideration may not be as great as reported. They lie on the proposed extension of the Nevada Southern. It is confidently stated that their transfer to people able to work them means that Ferguson district shall be one of the important mining districts of the coast.

FOLLOWING are officers of the Academy of Sciences for the ensuing year: Dr. H. W. Harkness, president; Dr. H. H. Behr, vice-president; J. C. Cooper, second vice-president; George A. Moore, corresponding secretary; Chas. G. Yale, recording secretary; L. H. Foote, treasurer; Carlos Troyer, librarian; J. Z. Davis, director of museum; W. C. Burnett, Charles F. Crocker, D. E. Hayes, E. J. Molera, George C. Perkins, Adolph Sutro, John Taylor, trustees. At the annual meeting, at which 20 members were present, the officers presented their annual reports. The report of the treasurer, General Foote, showed that the receipts were \$28,921.54, and the disbursements \$18,451.62, the gain for the year being \$10,470.02. The society received from rents during the year \$26,341.75.

American Mining Laws.

A REVIEW OF MR. RICKETT'S ARTICLE IN THE ELEVENTH STATE MINERALOGIST'S REPORT.

By Samuel Butler Jr.

One of the noteworthy features of the State Mineralogist's report, recently issued, is a "Dissertation Upon the Origin, Development and Establishment of American Mining Law." The author of this finely written and highly interesting treatise is A. H. Ricketts, Esq., one of the most prominent members of the San Francisco bar. It is a masterly exposition of the mining laws of this country, and they are discussed with a view of making them particularly interesting to the miners of this State. It proves conclusively that the author is thoroughly conversant with the important subject which he so ably discusses. We doubt if there is to-day extant a more explicit interpretation of our mining laws in so brief a form. It is something that those interested in the development of our mines have sadly needed; and the manner in which the subject is presented will be highly appreciated by every one fortunate enough to secure a copy of the State Mineralogist's report. As the writer tersely remarks in a brief introduction: "The aptitude of the American people for such achievement, the history of its great growth should be interesting as well to the student of law as to the miner whose welfare is dependent upon its due administration." Presented to the miners of California in such a concise way, it will be instrumental in saving them much trouble and expense when they find themselves engaged in legal difficulties. While we do not contend that such difficulties can be adjusted through this source, it is very evident that it will materially assist the litigant in pointing out the course he should pursue. To quote the author again: "Experience in mining litigation has enforced upon him the consciousness of liability to mistake, and that forecast can never equal the result of past experience." He has sought to present such an epitome (and it assumes to be nothing more) of American mining law as will be of practical benefit to those engaged in mining pursuits. For this reason alone it should be read and appreciated by every miner.

The question is discussed from four different standpoints: (1) The customs and regulations of the miners themselves; (2) State and Federal legislation and Federal treaties; (3) Spanish and Mexican law; (4) Judicial decisions.

Dilating on the early customs of the miners in this State, the author says: "In the days of early mining in California and elsewhere, from the very necessity of the circumstances in which the miners found themselves, customs grew up which soon became a guide for all, or in mass meetings regulations were adopted concerning mining rights, and rules as to the working of them, which had the force of law in the locations where adopted, and constitute the American common law on mining for precious metals."

It is very evident from the foregoing that at the time of the discovery of gold in California the laws pertaining to mining were very crude indeed, and were not particularly adapted to the system of mining then being introduced into this State. This condition necessitated the adoption of a system more favorable to the manner of mining in vogue at that time. Meetings were held in different localities, rules and regulations were introduced and adopted which eventually became the "common mining law" of this State. In speaking of these regulations and customs of the miners, Senator Stewart, the author of the Act of 1866, which was the first measure of importance to the mining industry introduced in the halls of legislation, remarks: "The Legislature of California had wisely declared that the rules and regulations of miners should be received in all controversies respecting mining claims, and when not in conflict with the constitution or laws of the State, or of the United States, should govern their determination; and a series of wise judicial decisions has molded these regulations and customs into a comprehensive system of common law, embracing not only mining law, properly speaking, but also regulating the use of water for mining purposes. The miner's law," he said, "was a part of the miner's nature; he made it, he trusted it, he obeyed it." And Senator Stewart was thoroughly competent to discuss this question in such a manner, for he was once engaged in mining for "precious metals" in this county in the very early days, and it is not unreasonable to suppose that he took some active part in establishing the "regulations and customs" of which he so eloquently spoke.

In the year of 1866 Congress passed the first measure which had for its object the creation and establishment of a system of Federal mining law. Prior to this time there had been legislation of a sporadic and unimportant nature pertaining to mining lands in different States. But such legislation was wholly inadequate to contend with the new and perplexing conditions; and the Stewart Act was offered as a remedy. Referring to this Act the writer says: "It marked a new era in the development of the American

legislation; and yet, it is a singular fact to relate, in passing that in its title, mines are not mentioned, nor the purpose of the Act disclosed." It reads: An Act granting the right of way to ditch and canal-owners over the public lands, and for other purposes. Continuing on this subject he remarks that "the miners of California and the States and Territories adjacent thereto, have but a very inadequate idea of the imminent peril in which the pursuit in which they are engaged, was placed at the commencement of the Thirty-ninth Congress. There was a strong disposition in Congress, and the East generally, to make such a disposition of the mines as would pay the national debt. The idea of relieving the nation of the payment of the enormous taxes which the war had saddled upon them by the sale of the mines of the far distant Pacific Slope, about which few people to-day have any knowledge whatever, was the most popular that was perhaps ever started. Compelling other people to liquidate your obligations, has been in all ages and all nations a highly comfortable and popular proceeding."

If either of the bills originally introduced had been passed, the Pacific States and Territories would have received a blow which time itself could not efface. The Government could only have receded from the anomalous position it was about to take after the most irreparable and widespread damage had been done. While we cannot perceive the legality of such action on the part of the Government, still, should the purposes of the Government be carried out as originally intended, the consequences would be appalling to contemplate. We hesitate to think of the results of such ill-advised action. Instead of being the happy possessors of a young, stalwart and ambitious State such as now graces the western extremity of this great continent, the brightest gem in the diadem of America, with a capacity of producing almost everything susceptible to growth, surrounded by beautiful and well-developed towns and cities whose fame has reached the "utmost parts of the earth," we might have retired in solitude and contemplated a dreary, desolate waste, destitute of everything grand and noble which now adorns the work of nature in sunny California. But through the strenuous efforts of Senator Stewart, this calamity was happily averted, and to-day we are credited with having added, through our mines, to the circulating medium of the country the magnificent sum of \$1,300,000,000. Where is there a like area in the world with such a capacity for producing gold?

There are many other points of interest in Mr. Ricketts' treatise which are worthy of discussion, but space forbids the attempt. Suffice it to say that I have been informed by the State Mineralogist that the treatise has been published in pamphlet form, and I hope it will obtain a wide circulation throughout the mining regions. It is worthy of careful perusal by every miner, and will prove invaluable to all interested in that industry. The State Mineralogist is to be congratulated on the acquisition of such a valuable article and the author for the production of such a lucid and elaborate interpretation of our mining laws.

Grass Valley, Jan. 1, 1894. SAMUEL BUTLER, JR.

The Deepest Gold Mine.

TO THE EDITOR:—In an interesting account of Grass Valley, appearing in your issue of Dec. 23, the Idaho mine is stated to be "the deepest gold mine in the world." This statement is often made in California, but it is not correct. The shaft of the Idaho mine is 2182 feet in vertical depth and 3050 feet deep on the vein. At Bendigo, in the colony of Victoria, Australia, there are at the present time twenty-five shafts over two thousand feet deep, and six over 2500 feet, namely: New Chum and Victoria, 2662 feet; Lazarus, 2598 feet; New Chum Consolidated, 2582 feet; Carlisle, 2510 feet; Victory and Pandora, 2515 feet; "180", 2860 feet. In some of the above-mentioned mines sinking is in progress, and additional depth has been gained. The Hundred and Eighty, or "180" mine, the private property of Mr. Geo. Lansell, is the deepest gold mine in the world. All the shafts at Bendigo are vertical. The deepest gold mine in Colorado is the California, in Gilpin county, which is 2290 feet on the vein and 2090 feet vertical.

Denver, Colo., Dec. 27, 1893. T. A. RICKARD.

THE PRESS contains this week a review of Mr. A. H. Ricketts' article on American Mining Law, in the Eleventh State Mineralogist's Report, by Samuel Butler, Esq., of Grass Valley. Mr. Butler is a working miner, and his opinion of the value to miners of the Ricketts paper is entitled to be considered a reflection of the views of miners generally. Mr. Butler has given much attention to mining matters in Nevada county, and in California generally, and it is likely that he will in future be a frequent contributor to the columns of the PRESS. He is able to express himself clearly and intelligently, and his communications are certain always to contain much that is worthy of consideration.

Hydraulic Mining.*

A REVIEW OF THE INDUSTRY BY DR. HENRY DEGROOT.

In Eight Parts—Part II.

Prerequisites to Success.—In making choice of a hydraulic property three principal things are to be taken into consideration. First—the percentage of gold contained in the material to be utilized, of which there must seem enough to warrant the expenditure required for the purchase, equipment and cost of working the property, interest on capital invested included. Second—water in ample supply, easily available and capable of being delivered in the washing pit under a head that will insure effective piping; and, third—sufficient fall or “dmp” immediately below the mine to prevent the tailings accumulating to a troublesome extent, unless, as sometimes happens, the latter can be dropped directly into a stream large and swift enough to carry them away. The above conditions being present, a hydraulic enterprise, well conducted, may be expected always to reach a fair measure of success. If there is timber on or near the mine suitable for making sluice blocks, sluices, flumes, trestles, etc.; if it is accessible for teams, not far from railroad or river transportation, and the winter climate is not so rigorous as to form much ice or otherwise interfere with outdoor operations—these, though secondary, are by no means unimportant elements of success.

Prospecting the Deposits.—In making tests of the auriferous gravel to be examined, samples should be taken from every accessible part of it; from open cuts, if any there are

grade falls much below six cents per cubic yard, this being about the average yield of the gravel handled on the Pacific Coast. If the reports on the Ecuador gold fields, alluded to, may be credited, the deposits there will yield at the rate of 40 cents per cubic yard, but these reports remain to be substantiated by actual workings; moreover, the gravel banks of that country are by no means so deep as most of those in California.

Opening Up and Equipping the Mine.—A hydraulic property having been acquired and prospected in accordance with the rules above prescribed and proving satisfactory, the next thing to be done is the construction of a ditch for bringing in water for washing purposes. The cost of this ditch will, of course, vary according to size, length, natural obstacles encountered and difficulties to be overcome, these various hindrances, owing to the rugged character of the country traversed by these artificial waterways, being many and formidable.

In the endeavor to surmount these impediments, recourse has been had to structures of various kinds, such as flumes, trestles, open cuts, tunnels, iron pipes, etc., the flume in one instance, where was presented no other practicable way for carrying forward the water, having been bracketed to the face of a towering cliff, after the manner shown in the cut.

Nothing so bold or original as this has, perhaps, ever before been executed or attempted in the department of engineering, whether for the transmission of water or other purpose.

In selecting and locating the line of a ditch the avoid-

secured and disposed of in such a manner that they can be emptied into or passed over it, accordingly as this additional supply may be needed or not. The ditch should be furnished with an abundance of waste gates, located at points where the escaping water will not be likely to wash away the ground and endanger the ditch, which, by means of these escapes, can be speedily emptied when a break occurring makes this necessary.

The route of the ditch having been selected with proper care, equal care should be observed in making the survey, in the prosecution of which the size and shape of the ditch and also the grades must be fixed. The character of material to be excavated must be examined; sites for flumes and tunnels determined, and where sustaining walls and trestles will be necessary—in short, all the information needed to enable the contractor to estimate the cost of building the ditch should be furnished by the engineer and surveyor. While a fall ten feet to the mile—three-eighths of an inch to the rod—has generally been deemed desirable as insuring a free flow of water, and at the same time protecting the sides of the ditch from excessive erosion, many of the ditches in the mining districts of California have a fall of 15 and some as much as 20 feet to the mile—narrow and deep ditches with steep grades, rather than broad and shallow ones, being here the rule; this rule, however, being departed from where deepening the ditch is likely to involve much additional rock work. Owing to the solid nature of the ground traversed by these ditches a swift current works but little harm. If at any point an extremely heavy grade becomes unavoidable, the water, unless it can be dropped at once, should be shot down through a flume, thereby obviating any hurtful washing away of the banks. While all ditches tend to enlarge themselves by the process of erosion, their banks gradually become solidified and thus, through diminished leakage and absorption, their carrying capacity is somewhat increased. In view of the loss of water caused by evaporation, absorption and seepage, it has been suggested that the ditch at its upper end be somewhat enlarged, tapering gradually to its normal size, thereby supplying water to make good the losses occasioned by these several causes of waste, that due to evaporation being very considerable during the California summer.

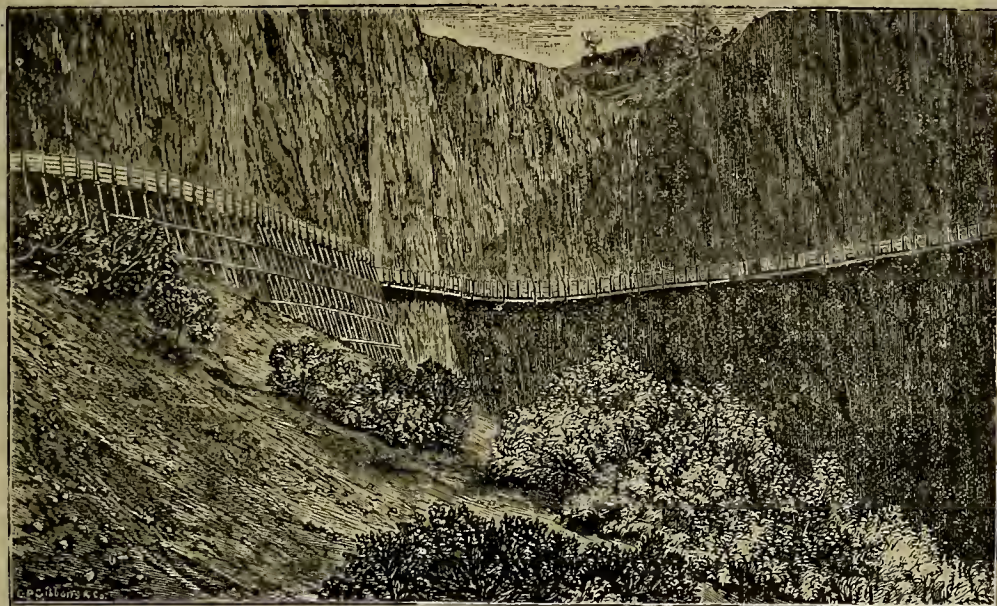
In length the ditches range from a few miles up to a hundred miles or more, exclusive of branches, the entire ditch system of some of our larger water companies covering a linear extent of nearly 300 miles. Generally the ditches in the counties central to the main gold belt are much longer than in the more northerly counties of the State because of the water supply of the mountains in the latter being so much nearer the mines. The cost of the main trunk of our larger ditches has ranged from \$100,000 to \$1,000,000, which sums have in many cases been increased from \$50,000 to \$500,000 for construction of branches. The capacity of these ditches varies from 600 or 800 to 7000 miners' inches—grade from 4 to 30 feet per mile, with an average of about 12 feet.

For further information in regard to length, size, grade and cost of ditches, water supply and consumption, reference is made to the ninth volume of this series of reports of the State Mineralogist, page 123, where a compendium of these and similar data will be found.

Treatment of Auriferous Pyrites.

A process has been patented by Mr. Florence of Peak Hill, N. S. W., for the treatment of auriferous pyrites by decomposition, says the *Mining Standard*. The principle is said to be so simple in operation that no skilled labor is required. Briefly, the inventor states it is Nature's own mode of decomposition hastened by chemical means. It is a well-known fact that heaps of auriferous tailings which have been left exposed to atmospheric influences for any length of time will, when tested by the dish, show prospects of free gold. Impressed with this object-lesson, and following up the clue thus given, the patentee proposes to subject tailings to the following treatment:

First, they must be concentrated, then dried and slowly calcined with ordinary agents until no free pyrites can be seen. The tailings are then placed in a solution under steam and boiling water, with cheap chemical agents, which finish the work of freeing the gold. Afterwards, simple amalgamation is all that is required. The process of calcining frees the acid—chiefly sulphuric—which works its own free will among the component parts of the pyrites. When the acid has done its work, the sulphides will be found to have formed soluble sulphates; and these, together with any alkalis that are not amenable to the heat, are neutralized and dissolved by the second part of the process. The product can now be placed in a Chilian mill and ground, and quicksilver added in the usual way. After the silver has been drawn off, the copper plate can be utilized to catch any little silver that otherwise must not have been obtained in the drawing off. The whole process, Mr.



BRACKET FLUME AND TRESTLE. MIOCENE COMPANY.

made by former workings, and from shafts sunk for the purpose; this prospecting work being carried always to as great depths as practicable, or as may seem necessary. For washing the samples of gravel so obtained, the pan sometimes, though more often the rocker, is employed. Where there exist facilities for using it, and there is much work of this kind to be done, the sluice should be availed of, and even the hydraulic pipe, if the ground has already been opened and equipped for active operations; the point sought to be enforced on the attention of the expert being that he perform this part of his work with thoroughness and accuracy. For a mistake committed in most other matters there may be found a partial remedy, but to go much wrong here is fatal and irreparable. And yet it is just here that the gravel inspector is apt to be deceived, if he do not deceive himself. There are often around those whose interest it is to mislead him. Then, very deceptive are these minute particles of gold, being the only ones he is likely to find in the top gravel where the most of these preliminary tests have to be conducted. Gathered in the pan or batea, these “colors” look big to the eye and much bigger under the glass, and yet it requires often a multitude of these almost microscopic atoms to weigh even a cent, whence arises the danger that our mine-viewer cheat himself if he does not suffer others to cheat him.

In this State, where all the conditions are first-class, gravel yielding a total of not over four cents per cubic yard can be worked by the hydraulic process with profit. As the conditions are less favorable, the grade requires to be higher; nor is it often safe to invest largely where the

ance of the above obstacles should be kept in view, earthwork, where the cost is not too great, being preferable to the building of flumes, especially where the latter require to be supported on elevated trestles, as these structures are comparatively short lived, needing also much repairing while they last. Beside being exposed to the wind and the likelihood of being blown down or destroyed by fire, they speedily decay, their average life not exceeding ten or twelve years. Better, as a general rule, carry your ditch by a considerable deflection around the head of a canyon than build a flume for transmitting the water across the depression encountered by a much shorter route.

But what is of still greater importance in this connection is securing an ample supply of water to continue, if possible, through the summer months, as then, the days being long, work can be prosecuted to better advantage than during other seasons of the year, while the water, warmed by the rays of the sun, promotes the action of the quicksilver, causing it to amalgamate with the gold much more readily than when the water is cold. In this style of mining, water failing, all work is intermitted—a good reason why the supply of water should be made perennial, if possible.

Again, the source of supply should be high enough to command the entire gravel deposit for which it is intended, as well as any other, if such there be, for the washing of which this water might at any time be made available. Being sufficiently high at the start, the ditch, in being carried forward, should be maintained at as great an elevation as practicable, to the end that ample head be insured for effective piping. Through faulty engineering, some of our pioneer ditches, when finished, demonstrated the soundness of the hydraulic theorem that water cannot be made to run up hill. It is always desirable that the head of the ditch be located below snow-line and have, as far as may be, a southern exposure. All water-courses on its line should be

*This article was prepared by the late Dr. De Groot for the Eleventh Report of the State Mineralogist, just issued; but its publication with that of much other valuable matter was prevented by the necessity of revision and omission, so that the volume might be reduced to reasonable limits. It covers familiar ground, but is, on the whole, a complete and careful review of the industry and hydraulic-mining methods. The article has been furnished this paper by State Mineralogist J. J. Crawford.

Florance says, takes from one to four hours, according to the nature of the stuff under treatment. The fumes can be condensed, and the health of the workmen protected. The cost in bulk, he states, will not exceed 20s. to 40s. per ton, and the lower price will often be maintained.

Important to Alkali Land Owners.

TO THE EDITOR:—The great importance of an abundant and reasonably cheap supply of gypsum as a fertilizer is recognized everywhere. Although not a universally efficacious fertilizer like the phosphates, its favorable effect on the legumes—peas, beans and clovers, (including alfalfa)—is enough, alone, to give it a prominent place in agriculture. Its special importance in California is due to the fact (first announced from the State Experiment Station) that it is an effectual antidote to the "black alkali" that afflicts some portions of the State, where it impregates the soil not so much in large continuous tracts as in spots varying from a fraction of an acre to several acres, where little or nothing can be grown, and which mar the continuity of fields, vineyards and orchards. Experience shows, moreover, that as a rule such spots extend their area as irrigation is practiced, invading bearing plantations of all kinds and causing loss and discouragement. Yet the fact that such lands when once reclaimed are profusely and lastingly productive, constitutes a strong incentive toward the utilization of the alkali lands, and renders the question of their reclamation for culture a very important one. The characteristic ingredient of "black alkali" being carbonate of soda, it follows that when gypsum is applied to land impregnated with it an exchange of chemical ingredients takes place, the soda being converted into "Glauber's salt" or sulphate of soda, while the gypsum becomes carbonate of lime, or chalk. Glauber's salt, with more or less of common salt, constitutes the "white alkali," which is rarely abundant enough in the soils to form a serious obstacle to their cultivation, being many times less injurious to vegetation than the carbonate of soda.

But gypsum acts not only as a neutralizer of the injurious effect of the carbonate of soda on the plants themselves; it is also of essential benefit in that it renders friable, and therefore tillable, the hardpan always formed in black alkali lands; moreover, it serves to retain in the soil the humus and phosphates which the soda has dissolved and which would be leached out of the land, to its great injury, if it were attempted to reclaim it by underdraining alone. These good effects have been verified in practice many times over, outside of the successful experiments made at the Experiment Station near Tulare. But until now gypsum—land plaster—has been rather too costly for general use on account of the heavy cost of transportation from a distance to the points where it is mainly needed, viz., in the upper San Joaquin valley; nor has quality of the material furnished been always satisfactory.

It is thus a matter of no little interest that a mine has been found and partially developed, which combines a location near the chief consumers of land plaster with an excellent quality of material easily mined and crushed for farmers' use. At the suggestion of Mr. John S. Dore of Fresno, the writer has lately visited the new mine and believes the results of the examination to be of sufficient general interest for immediate publication.

This mine is located in the ridges bordering the west side of the great valley, just north of Tome creek, and about five miles south of the Big Panoche. It was discovered in 1892 by Mr. J. H. Hall, of Selma, and is owned and worked by the Paoli Gypsum Company, of Selma and Mendota, Fresno county; the location being about 18 miles W. SW. from the latter station.

The main ridge, on which the gypsum appears at the highest level, extends about 2000 feet along the creek, to which it falls off steeply. Toward the north there extend from this ridge four spurs, from one-third of a mile to one mile long, on the crests of which the gypsum crops out abundantly, with a gentle dip toward the valley. The deposit on the crest of the main ridge, where most work has been done, shows a thickness of at least 30 feet, but its lower limit has not been exposed. At the foot of the east slope of the third spur (from the main summit), in a deep canyon and quite 150 feet vertically below the highest outcrop, there is a long exposure of a regular stratum about 18 feet thick so far as visible. Whether or not there exists a solid mass of the mineral from this outcrop to the summit cannot be seen; should such be the case the mass would be enormous, but in any case the deposit is a large one, sufficient to supply the needs of the San Joaquin valley for a long time to come.

The samples collected, which of course are essentially "croppings," show the material to be very nearly uniform from top to bottom; a yellowish-white chalky mass, easily crumbled and therefore readily put in shape for farmers' use. Eight samples were selected to represent the outcrops

on the crests of the several ridges, and also the one in the canyon mentioned above. The analyses of four of these gave the following results:

ANALYSES OF GYPSUM FROM PAOLI MINE.

	Gypsum.	Sand and Clay.	Moisture, Carb. Lime, Etc.
No. 1, from summit of main ridge	95.24	1.08	2.78
No. 5, from 2d spur, middle crest	94.74	1.52	3.74
No. 6, from 3d spur, in canyon	92.90	2.60	4.50
No. 7, from 4th spur, near road	82.20	8.21	3.75

These results render superfluous the analyses of the other four samples taken. It is probable that had the sample No. 7 been taken further from the surface, most of the sand it contained would not have been found, since the rest contain none like it. It is probable that the average of the deposit ranges above 90 per cent, since the only one of the samples taken in the mass of the deposit (No. 1, from the main workings thus far done) is the highest of all, and, counting out the two per cent or thereabouts of atmospheric moisture, is probably equal in purity to any thus far found in quantity west of the Sierra Nevada. Selected portions of the deposit will undoubtedly be available for burning into plaster of Paris for builders' use.

It is thus obvious that whenever this mine shall be worked on a proper technical basis, the other mines now supplying plaster will have to look to their laurels in competition with it.

E. W. HILGARD.

University of California, Dec. 26, 1893.

Ore Chlorination in Arizona.

Abridged from Letter of Robert DeLarge to Prescott Courier.

The concentrated sulphurets or arsenurets are subjected to a treatment of chlorine gas after a thorough oxidizing or chloridizing roasting. The chlorination works should be located with reference to the prevailing winds, with proper elevation of ground and a good supply of pure water. The sulphuric acid and chloride vapors are very destructive to all kinds of machinery they come in contact with. For roasting I prefer a double or treble Terrace drop furnace. The furnace is slower and requires more labor to handle the ore while roasting, consequently is more expensive. The ore, while being roasted, should be kept at dark red heat, and when started with working scrapers, show a few sparks; it is then ready to salt; then the chloridizing roasting proper begins. This is generally after a preliminary roasting of from four to five hours. Every ore is benefited by the use of salt, as the consumption of chlorine in the subsequent pregation is reduced thereby, aside from the advantage of a purer precipitate of gold, by the protosulphate of iron. Quantity of salt to be used ranges from three to ninety pounds per ton; large quantities are used when there is a good deal of lead.

When the ore is not thoroughly cooled before the treatment by the chlorine, a greater consumption of gas is the consequence, aside from a smaller amount of gold extracted. We shall now proceed to the dissolving vats, the insides of which are coated with a plastic coating of pitch and tar previous to using the first time, and thoroughly soaked in water to prevent impregnation of gold and loss. Each tank has a perforated false bottom so as to let the gas enter at the bottom and ascend to the top. When the gas is seen raising to the top of the vat the peep-hole is closed and a lively current of gas kept up for a few hours, the usual time ranging from five to ten hours to impregnate. The gas is generated in a leak gasometer, the cover of which is made gas-tight by means of a water joint; the acid is introduced through a bent lead pipe; the charge for the gasometer consists of a coarse rock salt, binoxide of manganese and oil of vitriol, to which is added water. When the lid of the vat is opened, the strong odor of gas is a sign of good work. Warm water is turned on carefully and the clear yellow solution is run through a canvas bag into a barrel, is conveyed from the barrel by a hose attached or inserted at the side to the precipitating tank. The solution when run into the tank is so delivered as to give the liquid a rotary motion, facilitating the coagulation of the gold particles and their final settling. The articles or materials used for precipitating are sulphate of iron and oxalic acid. The gold now at the bottom of the tank is a brown, earthy looking mass. The water is drawn off by means of plugs on sides of vat, the gold gathered up, squeezed through a cloth, dried and melted. If any precipitating takes place within the dissolving cast it is evident that so much of the gold is lost. The precipitating agents to be avoided are sulphur, antimony, arsenic and iron, though the peroxide of these metals is not injurious; therefore, complete roasting is essential to doing thorough chlorination.

There are many details I have omitted, such as the different kinds of ores, how to dispense with hydrochloric

acid, etc. This, I think, will give you a rough outline as to the reduction of ore by the chlorination process, and ought not to cost more than \$10 per ton.

The First Hydraulic Mine.

TO THE EDITOR:—I know there are other claimants to the honor of first applying the hydraulic in mining; I think, however, the claim of Mr. E. E. Matteson to that honor can be easily substantiated. He is now a poverty-stricken, broken-down old man, living in Nevada county. His story can be substantiated by old settlers who know the facts, some of whom now reside in San Francisco. I believe Mr. A. E. Head and Lee D. Cragg have personal knowledge of the facts narrated by Mr. Matteson; probably Judge Niles Searls, also; they were all at Nevada City at the time. The following is Mr. Matteson's statement of the event:

"I was mining in the spring of '53 at American Hill, about a mile west of Nevada City. We had a ground sluice and flume, and employed eight men. The bank was pretty high, and the danger from its caving considerable. One cave nearly caught me, wrenching a pick from my hand. I had spoken to my partners about using the water against the bank under pressure. The danger impelled me to put my theory into practice. I constructed a hose, four inches in diameter and 40 feet long, out of rawhide, with the hair on the outside. Of course, as this became wet it stretched, and when it dried it shrunk. The nozzle was $\frac{3}{4}$ inch, made of sheet brass enclosed in a wooden jacket. We had 30 feet fall, and at first used a nail keg set on a stump on the edge of the bank for a bulkhead; afterwards we put up a pork barrel in its stead. Before that we were using 12 inches of water, which carried away all of the dirt our men could dig. When we put up the hydraulic apparatus we hought 17 inches of water and with it knocked down more dirt than our flume and the water would carry away, having occasionally to stop until the flume cleared. We used the apparatus three months, and created much interest. After it became known that we were using it we averaged over 50 visitors per day. We hought the water from Jas. Whartenby, and the hooks of the company at Nevada City now show the amount we purchased, and that we paid 75 cents per inch for it. Our water bill was \$153 per week. For quite a while the claim yielded four partners \$50 profit per day each."

Mr. Matteson is a native of Rhode Island, aged 71 years, and besides making the first application of the hydraulic in mining, has made other valuable inventions.

Grass Valley, Cal., Dec. 28, 1893. CHAS. W. KITTS.

Placer Mining in Alaska.

Abstract from Description in Portland Oregonian.

The mining season only lasts three months in the year. The season opens about the middle of May and closes about the middle of September, and during those months the miners work like bees. The deposits in the stream are very rich in gold. The best diggings yet found in the district are on the Miller and Davis creeks, where the placers yield from five cents to \$1 a pan. I think that this year has been a more successful year for the miners than any previous one. It was estimated that \$750,000 in gold was taken out of this district last year, and I am quite confident that there was considerable more taken out this year. Where the condition of the country will permit, trails have been made, but most of the route is up and down mountains, across divides, over glaciers and by fording rivers. The most of the travel is done on foot, although parts of the distance can be done on sledges drawn by the Esquimaux dogs. Snowshoes are also used some. This system of travel is kept up continuously for over a month, when you have the satisfaction of arriving at Forty-Mile creek, and right before your eyes is a little village, consisting of log houses and about 300 miners. The scene would probably remind you of pictures you had seen of New York during the time of the early Dutch settlers. Here times are the same all the year round—no bank failures or no absconding treasurers to cause panics and dull times.

In the winter season the principal thing we do is to keep warm, and about all we do outside of that is to read, eat and sleep. Wood for fuel is scarce and we have to haul it over 12 miles on sledges drawn by dogs. We use the genuine specimens of Esquimaux dogs on our sledges. The miners have been experimenting on raising Esquimaux dogs, and as a result their dogs are larger and stronger than those of the Esquimaux and Indian. Two horses were brought into the district this year and they are doing well. They are fed on the native grasses and are looking fat and sleek. Our food is all shipped to us by the trading companies on the Yukon river. The only vegetable that we can raise for food is the rutabaga turnip. It is raised quite extensively by the miners and is a fair looking specimen. To give you an idea of what it costs to live in the

January 6, 1894.

mining districts of Alaska, I will quote a few prices of some of the necessities of life: Flour is worth \$15 per 100 pounds; bacon, 35 cents per pound; beans, 17 cents per pound; tin plates and cups, 50 cents apiece. A wooden shirt is worth \$7 and a pair of overalls \$2. The miners who go into that country earn their money, and the privations that a man goes through are oftentimes worth double the money which he takes away with him.

Influence of Country Rock.

Abstract of article in *Colliery Engineer* by Prof. Arthur A. Lakes of Colorado.

In most mining regions a relation has been observed between varieties of "country rock" and ore deposits. Veins in passing from one country rock to another are liable to change in the size or variety of the ore, widening in connection with some rocks, and pinching or growing narrower in connection with others.

Certain rocks are notorious ore-bearers, while others are notoriously barren over large regions, or in special localities.

The presence of certain rocks adjacent to other different rocks has an enriching tendency on the ore bodies.

As regards rocks that are good ore-carriers or receptacles of particular classes of ore in Colorado, we may say that quartzites and silicious rocks generally carry more pyrites, and are gold bearing.

That veins in granitic rocks carry a greater variety of minerals than others, and may be both gold and silver bearing.

That certain limestones carry much argentiferous galena.

That sandstones and other unaltered rocks carry little ore of any kind.

The influence of country rock on veins may be from several different causes, for instance:

Certain rocks are by their structure better adapted than others for forming regular fissures. Thus, massive limestone is better fissured than slate or shale, leaving wider open spaces for the ore to collect in.

Other rocks may be more porous and admit mineral solutions through their pores. Of such a kind are some of our porphyries.

Others, like limestone, are easily acted upon by solutions dissolving out the rock and replacing it with mineral by substitution.

Some are better conductors of heat, and therefore would assist chemical action and mineral solution.

And lastly, if modern theories of "lateral secretion" be true, viz., that most ore comes from the adjacent country rock and is precipitated, substituted or collected in the vein fissure, and further, that the metals themselves are derived from certain metallic elements in the ordinary constituent minerals of the country rock, such as mica, hornblende or augite, it is clear that a rock composed largely of such minerals would be liable to influence the vein as an ore generator. Granite and porphyries are largely composed of these minerals.

The frequent presence of eruptive porphyry rocks near veins and ore deposits in Colorado shows that they have an important influence on those deposits, which may be of various kinds:

First, that in their component minerals and mass they actually contain the elements of the precious metals subsequently deposited in another form in the fissure vein or in the soluble limestone in contact with it.

Second, by the heat which they retain for a long time after they have congealed and hardened, they would assist in the reactions of any chemical or mineral solutions that might be on hand. Lava, at the time of its eruption, is always highly charged with steam and other gases. By reason, also, of the chemical composition of porphyry, waters passing through it would be alkaline and assist in dissolving silica and other gangue or veinstone matter, and when the porphyry has thoroughly cooled it is exceedingly porous, and being much jointed and cross-fractured, becomes like a great sponge for the absorption of all surface waters. This may be noticed at Aspen, where all the mines that are at present penetrating through the "porphyry cap" are much troubled with water, far more so than in the underlying limestone. Surface waters, then, becoming alkaline by passing through this rock, and also more or less charged with carbonic acid, chlorine and other solvents, would be ready to dissolve both gangue and vein ingredients out of the porphyry and redeposit them in the vein fissure, or, by metasomatic substitution, in the limestone usually beneath it.

Water circulating in fissures changes or dissolves the ingredients of the surrounding rock. The rocks enclosing lodes are always so altered, and this decomposition and alteration is not always merely local or confined to the close proximity of the ore body, but we often find a whole mining district pervaded by this feature. So much is this the case that it is often difficult to get a fresh, unaltered

specimen of porphyry or some other country rock within the district.

"In lodes a mutual exchange takes place through the reaction of the ingredients of the rock and the materials of the vein. Thus, when water containing carbonates comes in contact with the rocks or minerals containing alkalies, a chemical reaction takes place. When these last are combined with silicic acid, these silicates are decomposed by the carbonic acid and the bicarbonates. This explains both the crystallizing out of the carbonates and the so frequent decomposition of rocks containing lodes, especially those which, like our veins of granite, are feldspathic."

The same principle applies to other ores and minerals in lodes. Thus the precious metals in the mines of Leadville in their original condition have been proved by depth to have been in a sulphide state such as iron pyrites (sulphide of iron), or galena (sulphide of lead), etc. Surface waters charged with carbonic and other acids, passing through the overlying porous alkaline porphyry and entering the underlying limestones, have, as we have previously observed, changed the sulphides into sulphates, oxides and carbonates. The presence of a dyke near to or cutting a vein has been found often to enrich the latter at the point of contact.

There is often a prejudice among miners in favor of certain rocks and formations, and against others. Miners who have worked perhaps in the great Comstock mine of Nevada, or the Leadville mines of Colorado, or the fissure veins in granite of the Old World, are apt to look out for and favor certain rocks and formations they find like those they have been accustomed to. Thus, as Mr. Williams says, "The peculiar 'porphyry' of the Comstock was hunted up in other districts, but did not prove metalliferous. Solid granite was looked upon by others as unfavorable, generally, because locally some granite above the gold belt of California had proved barren. Yet some of our best veins are in granite."

"Limestone was at one time a very unpopular rock and supposed only locally to produce lead, till the discoveries of Leadville and Eureka, Nevada, overturned the scale in its favor."

In the Leadville "excitement" not only was the particular carboniferous limestone of Leadville hunted for and prospected, but every other limestone in the South Park region, no matter what its geological age or position, was extensively prospected without results, miners not recognizing the fact that it was not limestone generally that produces rich ores, but a particular limestone of a particular geological period (the lower Carboniferous), not over 200 feet thick, that happened locally to be rich near Leadville, and the reason of its being locally rich at that point was owing to the concentration of eruptive energy at that point and the intrusion of an unusual amount of porphyries, which in point of fact are far more responsible for the ore than the limestone, which happens to be merely the receptacle.

It is not a particular rock or formation but a combination of favorable circumstances that alone can make a rich mining district.

As experience advances geologists and miners have proved that ore deposits have a much wider range than was once supposed. Formerly only the Archæan granite series was supposed capable of bearing ore deposits, because in the Old World, tin, copper and lead came principally from fissure veins in those rocks. Then deposits were found in the Paleozoic series and supposed to ascend no higher. But in the present day they are traceable even to the Tertiary.

It is not the rock nor the age, but a combination of circumstances, principally heat and metamorphism, that may make any rock of any period an ore-bearing one. And in prosecuting in new regions it is these combinations rather than any particular rock that should be looked for.

The Kimberly Diamond Mines.

It is not generally known that the Kimberly diamond fields are no fields at all, says an exchange. This mine is the actual crater of an extinct volcano; in fact, there are two of them. The miners have dug out the crater already to a thousand feet level, and looking down from the top it seems like an enormous well, the superficial area of it being six acres. They will never have to stop digging for diamonds until they get to that point beneath the earth's surface where the elements are in a liquid state. It requires a peculiar treatment to get the stones.

The blue stone, of something like the composition of our red sandstone, is dug out by the miners, is treated to exposure and water for some six months before it crumbles, and then is washed in a great pan. The average yield of diamonds is about three and a half carats to the ton, and some idea of the enormity of the deposits can be obtained when it is said that there are at times upon the floors of the

mines where these rocky deposits are placed something like \$23,000,000 worth of diamonds. The average of deposits is so thoroughly maintained that it is now easy to estimate what the value of each load brought from the bottom of the crater is.

These diamonds are sold to the agents of European diamond-cutters, although the yellow and rose-colored stones go for the most part to India, where they are very highly prized. A pool of English diamond-dealers recently bought a million and a half dollars worth of them. And the usual purchase made by any one party or syndicate is about \$250,000 worth.

The largest diamond mined, at least in recent years, which was taken out a few months ago, weighs 972 carats, is $3\frac{1}{2}$ inches long and $2\frac{1}{2}$ wide.

The parties who got this diamond paid only about \$8 a carat for it, since it came out with a lot which they had contracted to take within a certain time. Had it been discovered six hours later the parties would not have received it, for the contract would have expired.

The Laws of Optical Projection.

A recent controversy among electricians as to the photometric classification of search lamps suggests a few simple reflections on the laws which govern the intensity of projected light, says the *Optician*. Ordinarily, if the wave front be completely spherical, the law of inverse squares is exactly obeyed; but when a lens or a mirror is introduced, this is no longer the case, and the light now obeys some special "law of the projector."

The most curious law is that of the parallel beam. Some one proposed to utilize the constant intensity of such a beam in flashing signals to the neighboring planets, or to mount together a pair of large telescopes, with parabolic mirrors, place a very powerful light at the focus of the one, and through the other examine or photograph spots on the unlighted surface of the moon, etc. In photometry, the peculiarity of the parallel beam is that the candle-power, in the ordinary way of reckoning, increases, as the angle illuminated diminishes, with the distance from the source of light. Candle-power is ordinarily measured and expressed independently of the size of the photometric screen, and upon the assumption that the light, uniformly distributed, illuminates an area increasing with the square of the distance from the source. With a parallel beam, of course such a measurement of candle-power is without meaning. It eventually becomes infinite, if conducted at a sufficient distance from the radiant. With a converging beam, on the other hand, this nominal candle-power first increases, but not indefinitely, and afterwards diminishes with the distance.

No method of producing a very powerful parallel beam has yet been devised. Perhaps from that ignited molecule which happens to lie exactly at the focus of the parabolic mirror in a search lamp, a truly parallel beam of light may be emitted; but the surface generally of the radiant must lie without the optic axis. Hence in the construction of a projector one can only aim at obtaining an approximation to the required distribution of the light in a field at some given distance. The proper basis for an estimate of the candle-power is the illumination of the whole field; and on this basis, disregarding atmospheric absorption, the total amount of the light should be everywhere the same. To illustrate this way of designating the luminosity of a surface, we may mention an estimate of Lord Kelvin's which places the light of the full moon at some forty thousand million-million candle-power. This is the number of candles (roughly corresponding to the separate radiant particles of an ordinary luminous surface) that would have to be packed in close order, on the dark hemisphere of the moon, in order that it should emit the same light as at the full. In travellog to us this light is weakened by the inverse square rule; and so also would the exploring spot of terrestrial light mentioned in the last paragraph, even if it could be projected in the way described. Clearly, this simple dependency of the intensity of a given quantity of light upon the extent of the surface it illuminates—which resembles the dependency of the thickness of a uniform plate of known weight upon its area—is better accorded with by almost any of the proposed standards of light than by the "standard candle," of which the luminous area is quite indefinite. It is far better to make use of a square centimetre or a square millimetre of surface area of some incandescent solid. It will have been noted as a consequence of what precedes that there may be a great difference between the nominal candle-power of the beam projected by an optical lantern and that of the same light after dispersion by the lantern screen. In the first case the field of illumination is a small one; in the second, a complete hemisphere. Again, in the converse case, the "candle-power" of a lamp used in the ordinary way is, of course, enormously less than it is possible to be made by an optical collecting system.

Scientific Progress.

Gasification of Coals and Liquid Hydrocarbons.

In a paper on the above subject, Dr. P. Dvorkovitch, of London, stated that the present method of gasifying coal must be abandoned and the temperature lowered. He expected that such a radical opinion would meet with great opposition from gas engineers and chemists, but the value of the industry was too immense to let that prevail. In explaining what by experiment he had found possible, he would assume coal to be fixed carbon saturated with hydrocarbons, mostly belonging to the paraffine series. As far as he knew, Mr. Taylor was the first to obtain a patent for the manufacture of oil gas, in 1824. Shale oil was used, and the apparatus employed was so simple that Mr. Taylor was able to form a large company to work it, through which there were lost \$340,000. Taylor's apparatus had been varied by many inventors, but all had the same view—the gasifying of the whole of the oil—and therefore all had failed. The high price of liquid hydrocarbons and the absence of proper chemical knowledge of the method of gasification had hitherto resulted in failure. The attempt had been made to gasify the whole of the oil treated, without leaving any residuum, and, unfortunately, most of the inventors had succeeded in this attempt. The gasification of oil has been based upon the method of gasifying coal—namely, to destroy the unsaturated hydrocarbons; and this had been the main cause of wastefulness. In Russia, although the gasification of oil was carried on mainly with a view to obtaining by-products, yet under certain conditions the same quantity and quality of gas were obtained as in England. Of course, in western Europe and America, where gas was largely used, it was natural that the production of gas should be made the main object; but in Russia, where gas was little used, the chemists had to devote their energies to the production of by-products.

In the experiments he wished to detail he had employed three distillates—solar distillate of 0.8625 specific gravity, special solar distillate of 0.8852, and special distillate of 0.8891. He gasified them in an apparatus consisting of two iron pipes laid one above the other, and connected at one end. Distilling solar oil at 1600° F., he obtained 120 cubic feet of 22-candle gas per gallon, or 576 candles per gallon, and 32 per cent of bye-products. At 1300° F. the yield of gas was lower, but the quality was much higher—the candles per gallon were 665, and the by-products were also much larger in quantity. It seemed to him that from the first invention of gasification down to the present day an enormous loss had been going on, and it was really wonderful that the subject had not attracted more attention.

Discovery of the Telescope.

As in many other cases of discovery, that of the telescope appears to have been the result of a playful accident, says the *Optician*. Several stories are told about it, but they are all similar. The one most generally accepted tells how, about the year 1590, just 303 years ago, the children of Zachariah Jansen, a spectacle-maker, residing at Middleburgh, in Holland, were playing one day in their father's workshop, and observed that when they held between their fingers two spectacle glasses, one some distance from the other, and looked through them at the weather-cock on the church, it seemed inverted, but very much nearer to them and greatly increased in size. Their father, when his attention was called, saw that one of the glasses was convex and the other concave. He made experiments, and ended by fixing such glasses in wooden tubes a few inches long and selling them for curiosities. An-

other account tells us how one Lippersheim discovered the telescope in a similar manner. Descartes, however, a contemporary, gives the credit to James Metius, a glass-cutter in Holland, whose brother, a professor of mathematics and a maker of burning glasses and mirrors, hit upon the discovery in the same way that Jansen's children are said to have done.

Diamonds in a Meteorite.

When the first announcement was made a little over two years ago that small diamonds had been found in a mass of meteoric iron picked up in the Canyon Diablo, Arizona, it was received with some skepticism. The tests made, early in 1891, with these particles, employed acids against which the alleged diamonds were proof, and abrasion with corundum. This latter substance, one form of which is emery and another the sapphire, was then the hardest known to science, with the exception of the diamond itself; and corundum was as easily scratched by the minute points hidden away in the Canyon Diablo meteorite as gypsum is with a knife.

A number of other experiments were tried by various experts; and finally Mr. George F. Kunz, associated with Tiffany & Co., of New York City, suggested that if enough of the wonderful grains could be procured for that purpose, it might be well to try to polish a diamond therewith. In the latest number of the *American Journal of Science* Mr. Kunz (in co-operation with Dr. Oliver W. Huntington) describes this attempt, which was made at Chicago during the closing days of the Fair. A rough diamond, lent by Messrs. Tiffany & Co., was tried first upon a clean, new wheel, making 2500 revolutions a minute; and at the end of five minutes it had not been scratched. Upon the surface of the wheel Mr. Kunz then put a mixture of the particles whose character he desired to ascertain, with oil; and the instant the diamond was freshly applied a hissing and grinding sound was heard. In three minutes a face had been cut and polished on the diamond. A smaller crystal was similarly tried afterward with the same result. A new substance called carborundum having been discovered (or invented) in the last year, this was now tried upon a stone known to be a diamond. Not only did it fail to affect the jewel, but it was itself scratched thereby. Thus it was proven that the mysterious particles were fully as hard as the diamond, and the other evidence that they were, indeed, black diamonds themselves, received corroboration.

This is the first instance of the kind on record. A meteoric stone picked up in Russia in 1887 was suspected of containing diamonds, but the suspicion was never verified. The particular grains found in the mass from Canyon Diablo were too small to possess a commercial value, and their quality, too, was not what a jeweler would demand. Nor is it likely that the market will ever be supplied from similar sources. What renders the Canyon Diablo discovery of the most interest, therefore, is the fact that Nature, outside the limits of this planet, has been working as the French chemist, Molssan, did about a year ago; crystallizing into diamonds carbon which had first been absorbed by superheated iron. It may not be many years before jewels far superior to either of these products are manufactured by man.

Light Intensity of Tints.

Mr. Joseph W. Lovibond has described, in a work entitled "The Measurement of Light in Color Sensations," the arrangement and applications of his tintometer—an exceedingly useful instrument for measuring and defining the exact tones and densities of colors. The peculiarities of Mr. Lovibond's apparatus and system include the use of graduated colored glasses as standards of comparison, of appliances for excluding side-

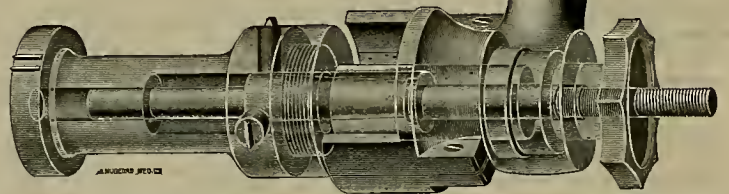
light, and for giving a direct view without the use of lenses, prisms and reflectors. In addition, the author has a whole scheme of color notation and nomenclature, whereby the faintest tints noticeable to normal vision may be named and classified. He poses as the three primary colors—orange, green and violet; and he limits the number of separate color sensations to 12, six of which are simple and six compound. The practical applications of the tintometer are already numerous. It is extensively used in the examination of water, in the analysis of steel, and in paper making, flour milling, etc. Indeed, it is obviously indicated for use in any industrial process which involves the employment of the eye in judging colors. This has hitherto been dependent upon the interpretation, which may easily vary with different interpreters, of such terms as dull red, white hot, etc., and it must be of advantage to be able to assign a numerical equivalent to such vague expressions.

Mechanical Progress.

Boiler Tube Cutter.

The Le Vasseur boiler tube cutter for cutting out old tubes or flues for removal or otherwise, and for turning off new flues or cutting pipe, consists of a mandrel conforming loosely to the size of the tube to be cut, in which are knives or cutters radiating from and attached at their base to a mandrel (within the before-mentioned mandrel) of varying diameter and provided with a screw by means of which the knives may be fed out as the cut in the tube progresses.

In operation the tool is placed in the tube with the knives at the point to be cut. The



tool is then revolved by means of a ratchet and handle and the nut is held stationary, which gradually draws the inner mandrel toward the handle, thus bringing the larger diameter under the heels of the knives and throwing them out against the inner wall of the tube, the operation continuing in this manner until the cut is completed. In removing the tool from the tube the nut is run back to its original position, allowing the inner mandrel to be pushed away from the handle, retiring the knives into their sockets.

It works rapidly, makes a clean cut without splits or breaks. It is manufactured by the Gouverneur Machine Company, Gouverneur, N. Y.

Amalgam Cement for Porcelain.

A very stable and lasting cement for articles of porcelain that do not have to be submitted to a very great degree of heat is made, according to the *Farben Zeitung*, as follows: First prepare a fine powder of metallic copper, by shaking a solution of copper sulphate with granulated tin. Wash the powder well after precipitation. The proportion of this powder will vary according to the desired hardness of the cement (which is, in fact, an amalgam), and may run from 20 to 36 parts, the rule being the more copper, the harder the cement. Place the desired quantity in a porcelain vessel and add to it sufficient sulphuric acid of 1.85 s. g. to make a pasty mass. Add at once 70 parts of metallic mercury and stir constantly until a homogeneous amalgam is obtained. Wash with plenty of warm water until all the sulphuric acid is removed. To use this amalgam, it must be heated until it becomes like wax. The edges of the article to be united should also be heated to about

375° C. (about 706° F.) When applied to the heated amalgam, a portion of the latter will attach itself to the edges, which may then be joined. As soon as it is cool, the article is ready for use. It will then stand heat up to 500° F. without any danger.

Making Large Steam Pipes.

At the New York meeting of the American Society of Mechanical Engineers, Mr. C. H. Manning read a paper in which he described a method of manufacturing large steam pipes which he employed 11 years ago for several thousand feet of 20-inch pipe, with very satisfactory results. The pipe was made of mild steel $\frac{1}{4}$ inch thick, double riveted, and with die-forged flanges $\frac{3}{4}$ and $\frac{1}{2}$ inch thick. The pipe was riveted with an Allen pneumatic riveter having 70-inch reach of arms which limited the length of sections. The longitudinal seams were placed quartering 45° from top of pipe, with the laps pointing up so as to be readily accessible for calking. The quarter turns were made of two 5-16-inch sheets curved on a cast-iron former, and having a row of rivets along the back and another along the throat. The tees were made of three sheets, shaped over similar formers, and the rivets were all on the sides. A serious difficulty had been previously experienced in keeping the round-

about joints tight. Leaks had been caused by condensed water retained by these seams, which caused unequal expansion, as the portions covered by them heated much slower than the unprotected or dry surfaces. This was remedied by making the section conical and bringing all the laps in one direction, and then laying the pipe on a down grade with the smaller ends the lowest so that the water ran out. The last course of the pipe was not coned, to avoid having two sizes of flanges. Mr. Manning has never known a riveted pipe to give out under water hammer, and a hammer that would completely wreck a cast-iron pipe or split a welded pipe would only strain the longitudinal joints of a riveted pipe.

Soldering Aluminum.

By means of the alloys mentioned below, aluminum or other metals, such as iron, tinplate, zinc, copper, brass, nickel, it is said, can be rapidly and easily soldered, either with the brazing iron or blow pipe. Aluminum can also be soldered to any of the above metals; the material is cheaper than any hitherto employed, gives a solid joint and does not injure the metal by oxidation or otherwise: (1) Unalloyed pure tin, melting point 250°; (2) tin 1000, lead 50, melting point 280° to 300°; (3) tin 1000, zinc 50, melting point 280° to 320°; (4) tin 1000, copper 10 to 15, melting point 350° to 450°; (5) tin 1000, nickel 10 to 15, melting point 350° to 450°; (6) tin 900, copper 100, bismuth 2 to 3, melting point 350° to 460°. The first three do not color aluminum and can be used for ornamental and artistic objects. Four and five are yellowish in color, but have the advantage of higher melting point and greater strength and hardness, and suggest the pos-

sibility of using aluminum for various articles and purposes for which hammered, coated, or enameled iron, tinplate, copper, zinc, lead, etc., are now used. The *Journal* of the Society of Chemical Industry says the last alloy can be made to assume any tint of yellow by varying the proportion of copper, and is therefore suitable for soldering aluminum bronzes; the proportion of bismuth is adjusted so as to keep the melting point suitable for the use of the brazing iron.

To Wash Carbon from Smoke.

The directors of the Birmingham, Eng., mint have adopted a practical method of remedying a long-endured nuisance. The thick black volumes of smoke proceeding from the high chimney-stack of the local mint have long been a series of annoyance to the district, and the shop-keepers especially have suffered to no inconsiderable extent from the same source of trouble. The Mint Company has suffered perhaps as largely as any one in the vicinity, and has had on many occasions to answer the complaints of the health inspectors and to pay heavy penalties incident to the proceedings that have from time to time been taken.

The Birmingham *Gazette* says that recently a gentleman who owns a large joinery establishment at Newbury, Berkshire, expressed his willingness to wash the smoke by an original process of his own. The invention which he has introduced at the mint has met with the entire approval of the directors of the company, and has also given satisfaction to the health authorities of the city.

First the smoke is drawn from the stack by a powerful fan, and it is then forced through a revolving cylinder into a tank filled with water. Perforated heaters are attached to the back of the cylinder, and these drop into the water and scrub or wash the smoke, which is put back into the chimney in the form of a perfectly pure vapor. The solid carbon which is washed from the smoke is brought out at the bottom of the tank all bubbling and boiling over, to all appearances a black, foaming froth.

The arrangement of the apparatus allows an inspection of the washing process, and of the vapor, which, after the cleansing has been performed in the tanks below, is perfectly white and odorless, and is thrown through the chimney into the air as steam. It is an interesting fact that the black extract is admirably adapted for use in the composition of paint and printing ink, while the ammoniated water remaining after the process of washing possesses the properties of a powerful disinfectant.

Fuel of Steamers.

The American liners New York and Paris burn about 330 tons of coal per day, or about 30,800 pounds per hour, and maintain about 18,000 indicated horse power, which is equivalent to a coal consumption of 1.71 pounds per hour per horse power. The average for all the fast ships with triple expansion engines, like the New York, Paris, Majestic, Teutonic and Furst Bismarck, is probably only about 1.75 pounds per hour per horse power. In the case of the Umbria and Etruria and similar ships, which have only compound engines, the rate is higher. For example, the Etruria burns as much coal as the New York and more than the Teutonic, and develops far less power than either of them, which illustrates the great advance made in marine engineering by the introduction of the triple expansion system.

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Useful Information.

Varnishing.

Varnishing is a subject that has been written on time and again, and may seem to old and experienced finishers to be almost worn out, says *Varnish*. But they must remember that because they can go ahead and produce a first-class job, that there is a younger class of painters growing up who lack the experience and knowledge possessed by the veterans.

I sometimes wonder why a certain article was published, as I knew all about that subject, but then it occurs to me that perhaps some one else didn't know all about it, and it would benefit them. There are some men who haven't the opportunities they should have; there are some who do not avail themselves of their opportunities; there are some who do not combine judgment with their experience; some who never read a trade paper; some who never get anywhere beyond the shop in which they work. All these men have much to learn, if they only will.

In varnishing a job, I claim that nearly as much responsibility lies with the rubber as with the finisher, for if the job is poorly rubbed and cleaned, the job will not be up to the standard when done, no matter how good the finisher is. But the finisher must shoulder all the blame.

I once worked in a shop where they always used the best rubbing varnish to finish with, so that it could be rubbed down and have another coat of the same at some future time. That painter had neither judgment nor confidence in himself or he would not have been afraid to use wearing body varnish instead of a rubbing when he went to finish. He was always nervous and fidgety over the results.

We all think our ways are the best, because we have become familiar with them and we obtain good results. But I don't see that the process makes much difference so long as we produce the desired surface and finish.

I think it is necessary to get acquainted with the varnish we use and learn its peculiarities. Afterward we can make the varnish do about what we want it to do, with judgment mixed in.

As a rule, it is the man who is always shifting from one varnish to another that is always in trouble over his work. Find a good standard varnish that you can handle and then stick to it, and the longer you use it the more familiar you will be with its workings and the better will be the results.

About applying the varnish: Don't be afraid of it, and don't get nervous over it, but be bold and let the varnish know you are not afraid of it. Then you can handle it as you like, and that is all there is to it. Take a panel and apply an even coat all over it, putting on all you think will lay there and flow out full, wipe out your corners and top and bottom edges lightly and then leave it. If the temperature is right, and wind and weather favorable, you will come out all right.

Safety Elevator Device.

The hydraulic hoists for the accommodation of traffic in the tunnel under the Clyde at Finnieston are so far completed as to undergo tests, says the *Colliery Guardian*. One of the principal devices of the hoists consists in dogs automatically projecting into the guides and stopping the movement of the car when any of the ropes break or even show signs of slackening. The tests were directed to ascertain the efficiency of the gear by which the dogs or great clips are to be worked at Glasgow.

A heavy timber frame was used to serve the purpose of the great shafts sunk in the quay walls at Glasgow. This frame was 20 feet high, and in it was suspended a temporary cage arranged to be dropped sud-

denly with greater shock than would be the case even with ropes breaking. This was done by the pulling of a trigger. This cage, which with its attachments weighed 1630 pounds, was loaded with 30,221 pounds, so that the weight of all was over 14 tons. Two cords were attached to the cage to represent the governor rope of the completed cage, and these were arranged to operate the dogs when the rope actually suspending the car gave way. The greater the distance the car fell the greater the stress on the dogs or clips. The actual resistance of the pair of safeties was 52,830 pounds, or 26,415 pounds each.

When tested, the cage dropped a total distance of two feet ten inches, at which point it came to rest. With the gear on the north side of the cage in operation the cage fell 13½ inches, and was stopped in a further distance of 20¾ inches, while with the gear on the south side in operation the cage fell 13½ inches, and was stopped in a further distance of 20½ inches. The average was therefore a fall of 13½ inches and stoppage in 20½ inches, so that the cage was only able to drop two feet ten inches after the ropes broke, when it was brought to a complete stop. This is very satisfactory when the great weight is considered. Moreover, it was found by calculation that when the safety gear went into action the car was traveling at the rate of 8.4 feet per second. The cage was brought to a stop without any shock, the foreman in charge of the tests being upon the temporary staging on which the weight and cage dropped.

Coke Sweating.

Wm. N. Page, of Ansted, W. Va., makes an interesting statement on the phenomenon of coke sweating. While he does not attempt an explanation, he certainly cites observations sufficient to leave no doubt as to the facts he presents. He says: "A series of observations which I have made through a period of ten years, and with different cokes, has shown that during the hot summer months dry coke, containing not more than one per cent of moisture, drawn fresh from the ovens, and loaded directly into tight box cars, without any contact with water on the yard, and in the absence of any rain, will become saturated with water when the car doors are tightly closed, but when slatted and left open no such phenomenon appears. In a car so loaded with coke drawn from a bee-hive oven at red heat, and with closed doors, at the end of a week water would be dripping through the bottom of the car, and the coke would average from five to ten per cent of water, while in a similar car, loaded at the same time, with doors left open, all other conditions being the same, the coke contained less than one per cent of water. If these conditions are based upon facts, as is indicated by observation, what is the chemical explanation? We know that dry carbon, notably fresh charcoal, possesses the peculiar quality of condensing, or quietly combining oxygen and hydrogen, but while the oxygen is easily accounted for, whence comes the hydrogen? It is possible that sufficient quantities of this gas may be contained in the cells of the coke and given up so slowly as to diffuse with the oxygen in a close car, but escapes when open. It is more than probable that the free oxygen is bottled in the coke cells, and the harder and denser the cells the longer it is retained; but in the absence of further information upon the subject, such a theory is not entirely satisfactory. On this point the experience of other observers will be of great value to both the manufacturers and consumers of coke. While I cannot say that the sweating does not occur during the winter months, owing to the difference in atmospheric conditions, my attention has been directed more particularly to the hot and dry seasons. A remarkable feature observed is the fact that the moisture contained under such conditions seems to be in

excess of the capacity of the coke when simply immersed in water."

A New London Bridge.

The great new bridge across the Thames, opposite the Tower of London, is now nearly finished. It has been built upon the Bascule principle, in three spans, with two great masonry piers rising from the bed of the river. At this point the Thames is 940 feet broad and the depth of the water in mid-channel varies, according to the tides, from 30 feet to 35 feet 6 inches. At a distance of 270 feet from either bank, these great piers—204 feet in length and 100 feet broad—are built, rising from the foundations 27 feet below the river bed, excavated in caissons through the London clay. They cost, including staging, £110,122.

The masonry is of finely-jointed Cornish granite, lined internally with brickwork. Each pier contains a chamber in which works the heavily-weighted balance of the lower roadway leaf; each of these two leaves weigh little short of 1000 tons. When the two leaves, each 100 feet long, are closed, the lower roadway of the bridge is practicable for all kinds of traffic, pedestrian and wheeled, but the space of 30 feet, only, between the roadway and high water is insufficient to allow of masted vessels passing. It is to allow tall ships to pass that the draw-bridge principle comes into play. The hydraulic machinery placed at the Surrey side of the bridge is capable of raising the 2000 tons of iron and steel composing this movable roadway in two minutes, and it is confidently declared that the opening of the roadway, the passage of a ship and the closing again will take only five minutes.

Solidified Petroleum.

The method of making fuel bricks of crude petroleum adopted by Engineer Mastracci, of the Italian navy, is as follows: The bricks are of similar form and size to the coal briquettes extensively used in France and Germany. The mixture is made in the proportion of one liter of petroleum, ten per cent of rosin, 150 grams of powdered soap and 333 grams of caustic soda. The mixture is heated and stirred at the same time; solidification begins in about ten minutes, and the operation must then be carefully watched. If there is a tendency to remain liquid, a little more soda is added. The mixture is stirred until the mass becomes nearly solid. The thin paste is then poured into the molds, which are placed for 10 or 15 minutes in a drying stove. The briquettes are then cooled and are ready for use in a few hours.

Signor Mastracci recommends the addition of 20 per cent of wood sawdust and 20 per cent of clay or sand, which will make the briquettes cheaper and more solid. In trials made at Marseilles on several tug-boats the petroleum briquettes furnished about three times as much heat as coal briquettes of the same size. They were burned in the ordinary boiler furnace, without any special preparation, and gave out very little smoke, leaving also little or no ash. The advantages claimed for the petroleum briquettes for marine use are the absence of smoke and a large reduction in bulk of fuel which must be carried, as compared with coal, while the risks attending the carrying of liquid fuel are avoided.

To Strengthen Copper Pipe.

A method of strengthening copper steam pipes by means of coiled metal wire is described by Nabor Soliani. The practice is to serve the tubes over with one or more layers of closely laid metal wire, wound on under tension. Drawn tubes up to about eight inches in diameter are made out of copper sheets by brazing in the usual way, and are then wrapped round with a close spiral of copper or Delta metal wire. This method has been adopted in the Italian navy.

Electricity.

Nikola Tesla.

Perhaps the most daring of the experimenters of the latest decade of the nineteenth century is Nikola Tesla, who was unknown to the scientific world five or six years ago, but who to-day is regarded as a second Edison, and who has achieved more magnificent results than any half-dozen of his contemporaries combined.

To sum up his achievements in a few words is impossible, says *Paper and Press*. He has discovered, or, rather, demonstrated, the possibility of illumination without wires or globules in almost exact imitation of daylight. This lot he can vary to order, and although he has not been able to bring it to what he termed a commercial basis, he has advanced so far in the direction that comparatively little remains to be done before the public can buy daylight by the room instead of by the lamp or light. And this is but one of his marvels. He has produced a flame which does not consume and which gives out no heat whatever, and has thus laid the foundation for untold developments in every phase of electrical work. In the production of ozone by electricity he has also scored a distinct triumph. He has shown that nearly all sanitary problems can be solved by the aid of electricity, and he has also made immense strides in the direction of solving the problem of parceling out electrical force and enabling it to be applied to manual labor in every possible direction.

He was invited to visit London and explain his experiments on the very spot made immortal by Faraday. He went, and was received by the Royal Institution with due honors. The moment his fingers grasped his long glass tubes they glowed with a softened splendor, and when he waved them over his head they gleamed with a radiance which was described as weird, if not ghostly. He manufactured flames which appeared dangerous in the extreme, and then placed them in a wooden box, which was absolutely unaffected by them. He repeated these experiments, with several others, while the guest of the National Electric Convention in St. Louis, at the end of February, and he also explained the details somewhat more fully.

An Electric Lighthouse.

The present flash light at Fire Island, New York, is to be changed by the substitution of an electric light, the new light to have a strength of about 240,000,000-candle power, says the *Electric Review*. This will make it by far the most powerful light ever placed in a lighthouse tower. Congress has appropriated \$10,000 to change the light, and the Lighthouse Board will soon authorize the electric light to be put in. One of the largest lenses ever constructed has been recently purchased from France, and will be brought from Chicago, where it was on exhibition during the Fair. This lens is over nine feet in diameter, and was purchased ostensibly for the new light station being erected at Hog Island, Va., but the Board has decided to use it for Fire Island, and will transfer the lens now there to Hog Island.

The present light at Fire Island flashes at minute intervals, each flash being of five seconds duration. The new light will flash every five seconds, and will be less than a second in duration. The flashes will come with the rapidity of lightning, and will be so quick that bearing can be easily taken during intervals. The old light is visible under favorable conditions about 18 miles, but the engineer of the Lighthouse Board estimates that the powerful electric rays will be discernible fully 24 miles under similar conditions. By the aid of the new lens the light will be thrown on the heavens, and its re-

lection will be seen with ease by vessels approaching 100 miles away. The only light in existence which will approach it in power is the one off Havre, France, which can be seen reflected on the heavens 60 miles at sea. Its candle power is about 130,000,000. The great advantage of the new light will be its power to penetrate a fog. Ordinary oil lights can be seen a short distance only, but it is believed the new light at Fire Island will pierce the fogs and be visible ten miles at sea.

Electricity in Agriculture.

A bill has been introduced in Congress by Senator Pfeiffer, providing for the establishment of an experimental station for testing the use of electric power for farm implements and machinery, to be under the supervision of the Secretary of Agriculture, and an appropriation of \$10,000 is named for the first year's expenses in putting the plan into operation.

The value of experiments of this kind is not a matter of question to any one at all familiar with electrical work, says *Electricity*. As a means of propulsion for moving machinery, such as plows, mowers, reapers, etc., electricity would hardly be more adaptable than a windmill or a sail. We may assume that a 500-volt current would be necessary, and very few farms are equipped with electric power stations. But even with the necessary current supply, how is it to be adapted to the machines? The trolley is evidently out of the question, as it is hardly feasible to cover a farm with trolley wires close enough for plowing, and the storage battery is poorly adapted for running over plowed ground. In view of the fact that steam engines have failed in this work principally on account of the high cost, electricity, even if it could be applied, would be a still more expensive failure.

For running stationary machinery, such as thrashers, a motor may readily be used if the current is at hand, although a portable steam engine will probably be found very much cheaper.

The question is perfectly apparent in any particular case to almost any electrician, and there is no more necessity for government investigation of this subject than there is for a revision of the multiplication table.

Dry Batteries in Telephone Exchanges in Germany.

The openlog address of Herr von Hefner-Alteneck, president of the Elektrotechnische Verein, Berlin, dealt largely with telephony. He said:

"I note first that the magneto telephones, up to a recent date used as transmitters on many German telegraph lines, have been replaced by microphone instruments. Another improvement is the replacement of battery call bells by magnetos in the telephone service of the Berlin exchanges. I should likewise mention the substitution of dry batteries for fluid cells in connection with microphones, and that such cells have given great satisfaction. As you know, the administration has been carrying on exhaustive experiments with compound or bimetallic conductors, and, as I understand, with highly satisfactory results."

Marvelous Display in Texas.

Cuero, Texas, was treated lately to an electrical display such as has never been seen or heard in that section. It began with distant thunder, getting closer rapidly, and in less than five minutes there were heavy peals of thunder, and lightning flashes, and sparks or balls of fire are said to have descended within five feet of the ground and burst, making a loud report. The people were all frightened and are not anxious to have the same kind of a treat again.

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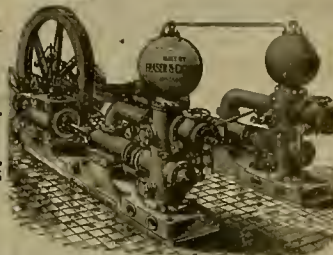
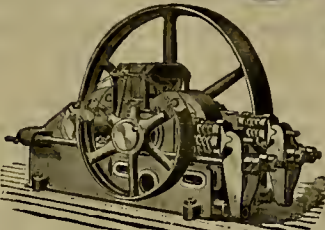
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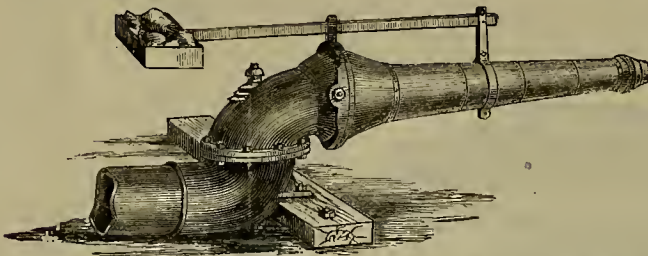
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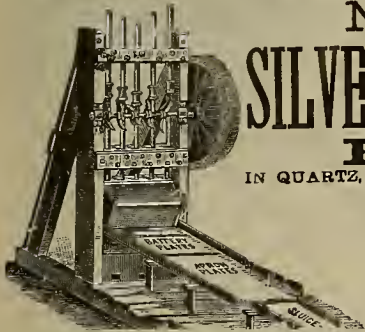
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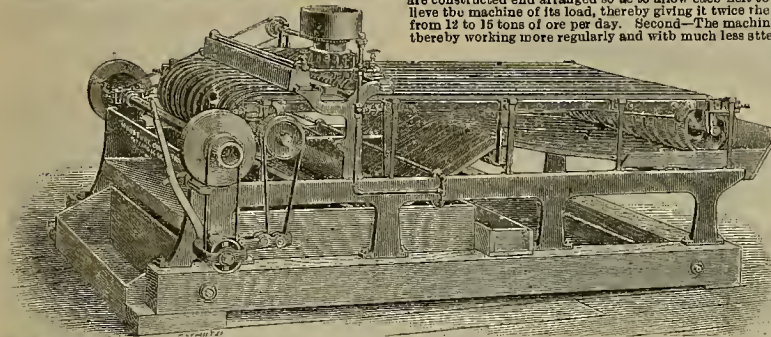
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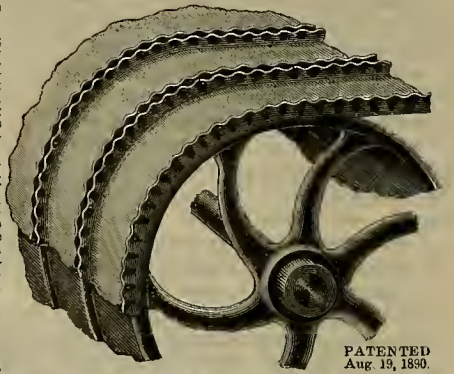
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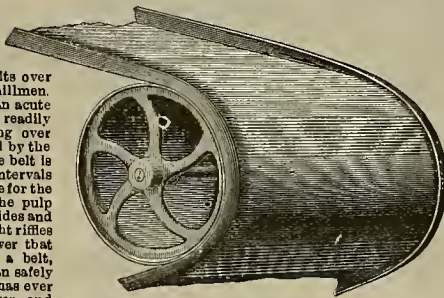
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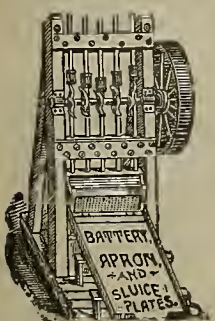
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Mining Summary.

The following is mostly condensed from journals published in the interior, in proximity to the mines mentioned.

CALIFORNIA.

Amador.

THE BAY STATE.—Enterprise Cor. Record: Sinking in the Bay State is progressing rapidly, and the contractors think that if no change occurs in the rock, they will make their 100 feet by the 1st of February. The bulkhead holds the water safe, and the sinking is comparatively dry. The Bay State is preparing to ship six tons of ore to the mining exhibit of the Midwinter Fair. There will be quite a lot of rock shipped from this district to the county exhibit, and there could be a lot more sent from the prospect shafts in the vicinity if the prospectors were able to pay freight on same to the railroad.

Butte.

GETTING READY FOR ORE.—Forbestown New Era, Dec. 29: Parties are at work upon the Mt. Hope mill, getting it ready for crushing ore. The mill is situated about four miles east of Forbestown. The mill will be almost entirely rebuilt, and will be operated by steam. The boilers and engine are on the ground. The ledge from which the ore to be crushed in the mill is to be taken has been worked before, but with the machinery then employed it could not be made to pay. The ore prospects well, and with the improved machinery by which it will be worked in the new mill there is no doubt but that it can be made to pay.

Faulkner & Bellingham are taking some excellent ore from their tunnel upon the Missouri mine, about a mile and a half west of Forbestown. They are in about 70 feet with their tunnel, and have a 20-foot ledge, which stands almost perpendicular. Several assays have been made of ore from this mine, one of which went as high as \$185 to the ton, and none under \$16 in gold. Experts are of the opinion that this mine is one of the best in the district, when everything is taken into consideration. A few days since a block was got down, the estimated weight of which was 2000 pounds. It was the intention of the owners of the mine to send it to the Midwinter Fair, but in the attempt to get it out of the tunnel it slipped from the truck, and fell in such a position that it could not be reloaded without breaking.

Calaveras.

GOON PROPERTY.—Angels Echo: The Gilman & Mercer mine, situated near Smith's Flat, is rapidly developing into a mine of great value. It is opened by a tunnel which is 50 or 60 feet below the surface. The vein or lode is nine feet in width, and carries a very large percentage of sulphurets which, it is said, will assay over \$1000 per ton. The mine is no doubt a splendid milling proposition. The present owners have not the means to develop the mine.

The Utica Mining Co. is engaged in running an open cut through Robert Rasmussen's lot, near the gas works. When the cut is completed a tunnel will be run from this point under the street to Chinatown. The tunnel, according to the survey, will be 14 feet below the level of the street. A flume will be built from the Matteson mine through the tunnel to the Stickle mill, the object being to convey the sulphurets from the mill to the works at the Matteson mine. The water now in Angels creek will pass through this tunnel.

Nevada.

AT NORTH BLOOMFIELD.—Herald, Dec. 29: The White Diamond quartz ledge, of which T. A. Fairweather is the locator, shows a fine prospect. The ledge is being worked, and all the extensions, north and south, are taken up. It is thought the White Diamond will make a mine.

J. Ostrom, too, has a good quartz claim. He picked up a nugget worth \$4.80 there the other day.

The Derbec drift gravel mine is looking pretty well, though only a day shift is worked—25 men in all.

T. A. Fairweather fell from a platform in the Derbec, last week, and fractured three ribs. He is recovering rapidly from the injury.

THE BELLEFONTAINE.—Herald: It looks as though the parties who bonded the Bellefontaine for \$25,000 might not come to time, and in view of recent developments the owners are willing they should not. If the mine is not sold as a whole, the company will soon put 25,000 shares of stock on the market, and the proceeds will be used in building a small mill. With a mill on the property, the owners could not make money faster than by working the mine themselves.

TWENTY STAMPS MORE.—At the California mine, Eureka district, 20 stamps will be put in next spring. The obstacles in the way of disposing of the property have all been overcome, and Col. Tozer is now free to make improvements and develop the mine.

MINA LOCATAN.—Telegraph, Dec. 28: A few days ago some parties in Grass Valley, headed by S. P. Dorsey, located some mining property bordering on the Grass Valley mining district, which is destined to become very valuable in the near future. They have named their claims the Texas, Tennessee and Louisiana. The district in which they are located has not been developed to any great extent, but the gentlemen who have now interested themselves in that section of the country will make lively times.

THE MURCHIE.—Transcript, Dec. 30: Two or three companies have of late been figuring on buying the Murchie mine. It is believed to be a good mine by many of the men who worked there at the time operations were suspended some years ago, and expert mining men who

have been here at different times to look at this mine all speak favorably of it. There are three ledges included in the company's ground, all of which, it is claimed, will pay if worked systematically.

RICH GRAVEL.—Transcript, Dec. 26: For the past few weeks the gravel in the Original Harmony has been steadily improving in quantity and quality, and now it is fully demonstrated that the owners have a big mine. On Saturday last a nine days' cleanup was made, which netted \$2200.

NEW HOISTING WORKS.—Transcript: Men have been set to work grading for the new hoisting works that are to be put up on the Merrifield mine by the Champion Company. The construction of the buildings will be pushed ahead as rapidly as the weather will permit.

NO SALE MADE.—B. N. Shoecraft appeared much amused when he heard that he had sold the Nevada City mine for \$100,000. He informed the Herald that he has once refused twice that sum for it, and that the man who wants the mine more than he does will have to pay what it is worth.

Placer.

PUMPS AT WOK.—Placer Herald: The pumps are gaining on the water in the Weske mine, near Michigan Bluff, and it is hoped to be able to commence taking out gravel early in the new year.

PUSHING WOK.—The Gold Ring Mining Co. at Green Valley, says the Colfax Sentinel, is pushing work on the mill. The weather has been much in their favor. They are finding some very rich gravel while grading for the mill site, and the channel is expected to show much better dirt.

MUSIC OF THE MONITOR.—Herald, Dec. 22: Hydranlicking was resumed in the Polar Star mine at Dutch Flat last Monday. Years ago Dutch Flat was one of the liveliest and most extensive hydraulic mining districts in the State; but the injunction era came and the mines in that camp ceased. But a new era has dawned, the result of wiser council, and a change is coming over the scene. Under certain conditions hydraulic mining may be resumed. So far as relates to the Polar Star, one of the big mines of that district, those conditions have been complied with, and under the direction of John Spaulding, the superintendent, the water was turned on again last Monday, and once again after years of patient waiting, and hoping against a condition that seemed almost hopeless, the music of the monitor is heard in that camp, and no orchestra ever had the exhilarating effect that the monitor's music has to the miner. This is the first hydraulic mine of consequence within Placer county to resume under the new order of things.

RESUMED WOK.—Placer Herald: Work was resumed again by the South Yuba Canal Company on the big new ditch which is to bring clear water to Auburn and materially increase the water supply of the entire foothill section of Placer county. The ditch is completed to a point not far from Colfax and it is there where the work has been resumed. The new ditch will cover the country around Colfax and much other land not covered by the present system. It will give to lower Placer a water supply for domestic, power and irrigating purposes not second to that of any other part of California.

Plumas.

TWO MINES TO START.—National Bulletin: On Tuesday morning early a force of men began the work of removing the hoisting works of the Loring & Leavitt mine to a position about 100 yards southeast of the Riverdale shaft on the Kellogg property, and on the line of the Elizabethtown gravel channel, north of Quincy. Both mines are now under the control of a New York mining man, who proposes to develop them. The work of removing and erecting the hoisting works will be pushed with all possible speed, so as to permit the sinking of the shaft to begin as soon as possible. It will probably be the first of February before the shaft can be started. The position of the new shaft will be such as to tap the channel near the center. It will drain and command a large stretch of the gold-bearing gravel deposits above. Parts of this that were mined years ago proved very rich, though the means and methods of working were respectively limited and inadequate.

TAIP TO THE MINES.—National Bulletin, Dec. 23: Last week the editor of this journal made a flying trip to Johnsville, Eureka Mills, Mohawk and Beckwith. Among the new enterprises to operate next year is the hydraulic mine owned by a Pittsburgh company, E. J. Sugden being the president and Pit Trayner the superintendent. The property is located only a few miles from Cromberg. During the past season the company did a great deal of work in fitting up the mine for operation. A reservoir and ditches were made, buildings erected, flumes put in and much other necessary work done. Mr. Trayner will soon begin the construction of such restraining dams as will be necessary to impound the debris, though the mine is so located that no damage to the lower country could possibly result from the operation of it.

During the past summer the Tefft mine has been worked on a small scale and with most flattering results. That this is a good property, the work of the past season has fully demonstrated. There is a large area of mining ground in this vicinity and those acquainted with it believe that it contains much treasure. Already Nevada capitalists are looking that way.

The town of Mohawk is quiet at the present time, yet during the past year much business has been done. During the winter season few of the small mines are worked, owing to the cold weather. In Mohawk valley and vicinity considerable gold is extracted annually by men

scattered here and there and mining in a small way. More than \$10,000 in "dust" has been shipped from that express office alone—shipments from the small mines referred to.

Since the big fire of a year ago Johnsville, owing to litigation as to the townsite and the unfavorable outlook at the Eureka mine, has not been rebuilt to the extent it would have been under other circumstances. However, it is probable that another year will witness more improvements. Greater confidence now prevails as to the future of that part of the county. Mining interests are looking up. Recent developments in the Plumas Eureka justify the belief that the old mine, which has produced millions in gold, will continue to yield large returns to the owners, consume vast amounts of produce and scatter its thousands among the people of the county. Few mines in the State have yielded larger returns during so long a period of time than the Plumas Eureka.

Contract work in the Jamsou mine continues. Messrs. White, Dunn and Smith, the contractors, are making good progress in the tunnel. The opening of spring will probably witness much greater activity about it. In the meantime development work will continue. Mr. Cheney, the superintendent, has gone to Shasta to look after property interests, but will return in February.

Shasta.

THIRTEEN TONS CRUSHED.—Democrat: Last week Peter Scherer crushed thirteen tons of ore from one of the mines in the Tellurium group that yielded \$28.50. This ore was taken from a new opening on the mine and was milled just as it came from a four-foot vein.

Siskiyou.

RICH DISTRICT.—Yreka Journal, Dec. 27: The quartz mine at Know Nothing creek, on the headwaters of Salmon river, has been taking out a great amount of rich quartz during the past season, and expect to do better every coming season as the claims are opened to better working advantage. This district bids fair to become one of the richest in the county, and with its development the adjoining creeks and gulches will be opened with good success by prospecting parties. The New river mines in Trinity county, on the opposite side of the ridge from Know Nothing creek, have also been yielding good returns during the past summer.

The Eastlick Bros. have been enabled to start up work at their hydraulic mine, Oro Fino, much earlier this season, by reason of the late rains furnishing a good supply of water in the ditches, with good prospect of continuance of water supply until midsummer.

The R. H. Campbell hydraulic mine at Quartz valley is also well supplied with water for starting operations, and will no doubt yield handsome returns, as extensive preparations were made during the past summer by drifting and other work to be ready for the winter season in good shape.

A Henley correspondent writes us that a porphyry dyke, ranging from 50 to 300 feet in width, has been discovered near that place in Cottonwood mining district. Its course has been traced for four miles, and it is soft and easily worked with a pick. It is full of small stringers of quartz which prospect exceedingly good. Mr. Legitt, of Medford, has a claim on this dyke, and Burleson & Rummel, Sullivan, Jones & Mitchell, and Call, Coleman & Co. also have claims. They say there is plenty of room for more claimants not afraid to handle the pick. One of the discoverers is so jubilant as to claim that he has found the long lost Rider Hidden mine, which parties have been hunting to find during the past fifteen years.

All the Klamath river miners will resume operations early in the spring, and they lament the losses sustained by the high freshets during the past few weeks.

The quartz mill at Judge Holcomb's mine on Salmon river will be started up this week in crushing quartz on hand, and he also has an arrastra testing a rich ledge in the same vicinity.

Trinity.

DITCH PROGRESS.—Journal, Dec. 30: The ditch of the LaGrange Hydraulic Gold Mining Co. is nearly ready to receive the water, the slides of earth occasioned by the last storm having been about all cleaned out. Thursday the water had been conveyed down from the head about one mile and by to-night (Saturday) the contractors will have passed over the worst part of the ditch with the water. The first four or five miles have been made difficult by the snow of the recent storms, but farther down the line this difficulty will not be encountered. If no bad weather interferes the water will be through to the mine in another week. The long tunnel on the east side of West Weaver creek was broken through Wednesday night and will be completed in a few days.

NEVADA.

Ferguson District.

TO START UP.—Pioche Record: The Hiko mill made a permanent start on Magnolia ore Tuesday morning in charge of Johnny Ferguson. Ten days hence we look for a good cleanup. The success of his enterprise means much for the immediate future of this district, as, if entirely successful, the mill will be open for custom ores from other claims in the district.

Red Canyon District.

GOON TWO-FOOT VEIN.—Enterprise, Dec. 28: Red Canyon is one of the most important mining districts in Douglas county. The ore there is gold-bearing, and very rich deposits have been discovered at intervals during the past 15 years. The amount of gold produced in that district is hard to estimate, for the reason that it was taken out exclusively by prospectors who were working their own claims and who kept the amount of the bullion produced a secret.

Last fall G. A. Fitzmier, of the City Bakery, who is sole owner of the Red Clond location in Red Canyon, employed two men to do the annual holding work on that location. These men cut into a vein two feet in width, a part of which shows high assay value per ton in gold. Next spring Mr. Fitzmier intends to take charge of the work of extracting and milling the ore. There is a five-stamp steam mill within a mile of the Red Clond which will be put in repair, and the ore extracted will be crushed in that mill.

ARIZONA.

RICH SILVER ORE STRIKE.—Prescott Journal: Geo. Leforse, from Groom creek, reports a rich strike by the Messrs. McCarty, in a silver-lead claim in that district. They have a foot vein of ore that runs 200 ounces silver per ton and about 60 per cent lead. Their shaft is about 45 feet deep, with this character of ore all the way down. Weckler & Morris have also made a great gold strike in the same district. They have a tunnel in on their ledge 50 feet, the ledge being four to five feet wide, and running from \$20 to \$100 gold per ton. The ore is free milling.

ANTIMONY FOUND.—It is reported from Magdalena that Thomas Yerkes has discovered an antimony mine nine miles from Santa Ana, Sonora. The assays that have been made are encouraging. The discoverer has sent several tons of the ore to smelting works in the United States to obtain practical results.

OREGON.

GOLD BUG DISTRICT.—Baker City Democrat, Dec. 25: A new camp christened Gold Bug district, is the latest to claim public recognition. The new camp is situated about seven miles west of Baker City. A few weeks ago Messrs. Hiram Maden, J. J. Nicholson, J. S. M. Foster, Harry Pring, Pete McAvoy and Edward Barker, British Columbia and Colorado Miners, commenced prospecting in the new district and the result of their labors has been most satisfactory.

J. S. M. Foster and Hiram Maden have four locations in a group, situated southwest of the Nelson placer mines. Messrs. Foster and Maden are at present developing the Annie May and Capitol mines and at a depth of 12 feet have a five-foot vein of ore, carrying free gold, specimens of which show particles of gold without the aid of a glass.

Messrs. J. J. Nicholson, Harry W. Pring, Albert Robinson and Hiram Maden have two claims south of the old Tom Paine property. They are running a tunnel on the pay streak and are now in 105 feet. The ore vein is about 15 inches in width and widening as work progresses.

Cavin Bros. and Sam Baisley have a fine showing in the Pocahontas mine, an extension of the old Tom Paine.

A mill erected by J. W. Sackett & Co. for custom work is in operation and is supplied with all the ore that the mill can handle and the results obtained thus far by mine owners have been very satisfactory.

In conversation yesterday, Mr. J. L. M. Foster, who has had many years' experience in Montana and Colorado, stated that the showing made in Gold Bug district eclipses anything he has ever seen in an undeveloped mining district and is more than enthusiastic over the future of the camp. How such a rich gold bearing district should have remained so long in obscurity is to him a mystery. But it can be accounted for on the hypothesis that in all these years the country has been simply run over by people who expected to pick up gold nuggets on top of ground and who when they discovered a prospect did development work with their mouth.

NEW CONCENTRATOR.—Ashland Tidings, Dec. 30: Mr. Staples, who is now in San Francisco, is expected to bring up with him on his return a concentrator for the mill on the Sterling ledge.

R. M. Garrett, Jack Garvin, Dr. Hirschlager and Crit Tolman came up from their mine on Williams creek last week, and report prospect work in progress with good results. Captain Ingalls, of Portland, another of the owners, visited the mine last week.

W. D. Anderson, a well-known miner and prospector, is in town this week from Sardine creek, and reports a good strike in one of his locations, about a mile from the Lindley quartz mill. The rock from a three-foot ledge assays \$17 in gold and \$6 1/2 silver.

It is rumored that an attempt is being made to compromise or settle the dispute for possession of the Hammersly mine at the head of Jump-off-Joe. Morton Lindley, of the Lucky Bart mine, and another man are said to be making the effort to bring Hammersly and Drew to an amicable agreement.

Will Q. Brown, of Riddle, reports that there is no prospect of anything being done at the nickel mines until spring, in any event. If the Chicago company is not prepared to commence active operations then, Mr. Brown believes another company will take hold of the business. There is a large quantity of nickel ore in that region not owned or controlled by the Chicago company, and the field will be open for a new enterprise if the old company doesn't begin to produce the metal.

MINING NOTES.—Jacksonville Times, Dec. 22: The Lucky Bart Mining Company have shut down their mill for the present, owing to the bad roads.

Ennis & Cameron are running on full time at their placer mines in Galice creek district, having an abundant supply of water.

Operations have been resumed at A. W. Sturges' placer mines in Jackass district, and a big run will doubtless be made there during the next few months.

Knott, Swinden and Donson of the Marland mine, in Kane creek district, have commenced a 500-foot tunnel on their property, and expect to do a great deal of work this season.

Coast Industrial Notes.

—Deputy Fish Commissioner Hunt, of California, has left Carson, Nev., with 90,000 ova of Eastern brook trout, to be placed in the water at Bear Valley, Cal.

—The Delamar Hotel, at Delamar, Idaho, was burned last week. The loss is \$25,000; insurance, \$5000. Several persons narrowly escaped being burned to death.

—The Idaho State Wagon Road Commission has let contracts aggregating \$114,500 for the construction of a system of roads to connect the northern and southern sections of the State.

—Mayor Pardee, of Oakland, has vetoed the ordinance prohibiting the use of gates on the local trains. The veto is made upon the grounds that the ordinance is illegal and the city would suffer defeat when the case was taken to the courts.

—The Metropolitan Electric Railroad Company in this city has petitioned the Board of Supervisors for one year's extension of time in order to complete the line to all points south and west of the intersection of Seventh avenue and I street. Financial stringency is alleged as the cause of delay in the completion of the road.

—The Siskiyou Mill & Lumber Co., says the *Dunsmuir News*, has the biggest sugar-pine board ever cut in the county, which they are about to ship to the Midwinter Fair for exhibition. The board is about 17 inches thick, 54 inches wide and 16 feet long. There is not a knot or flaw of any kind in it. It was cut by a hand-saw and is pure No. 1 sugar pine.

—The Mission-street bobtail cars, whose eastern terminus since last May has been at New Montgomery street, have begun running to the Oakland ferry. In the eight months which have elapsed since cars ran through, the old tracks have been displaced by substantial foundations and modern combination rails, preparatory to operating cars by electricity.

—T. H. Goodman, general passenger and ticket agent of the Southern Pacific has received a telegram from Tacoma, stating that the Canadian Pacific had put in a new rate of \$40 first-class and \$35 second class from Sound points to St. Paul, and a first-class rate of \$46 to Chicago. The rates are applicable by way of the Canadian Pacific and the "Soo" line.

—At a recent meeting of the Harbor Commissioners it was stated that the assignment of the San Francisco Bridge Company would not interfere with the work on the foundation of the new ferry depot, for which the company has the contract. Dredging is going on as usual, and the surety on the contract bond is sufficient to satisfy the board that there is no need for any proceeding toward a fresh contract.

—On the application of the creditors, George W. Hoadley, cashier of the National Bank of Arizona, has been appointed by the District Court to be receiver of the Phoenix (Ariz.) Electric Light and Power Company. The company was intimately connected with the defunct Hartford Bank. A re-organization is expected to bring the company out all right, as the franchise is very valuable and the assets are ample.

—The unemployed of San Francisco are to be given work. Business men, in a recent meeting, made a total subscription of \$14,000. This money is merely an earnest of a larger amount yet to come, and before many days, it is thought, a fund will be raised large enough to provide 3000 men with employment for the first three months of this year. They will be given \$1 a day and the employment will be in Golden Gate Park.

—The laying of the cable road for the extension of the Presidio and Ferries Railway Company's Sacramento-street line is completed with the exception of a single block on Sixth avenue, between B and C streets, and at several small places where crossings have yet to be put in. Work on the turntable at D street and Sixth avenue has been begun, and it is promised that the cable road will be ready for the cable cars by the 15th inst.

—Grapeland irrigation district, San Bernardino county, has run a tunnel 800 feet under the bed of the Lythe creek. Recently the workmen broke through the bedrock and struck a large stream of water and work had to be suspended until the tunnel can be protected from the wash of the stream. It is proposed to extend the works 150 feet further and tap the entire overflow of the stream, with which it is expected to irrigate the entire district.

—The San Diego City Council has adopted a plan which it is expected will solve the tramp problem. Work is to be given to all applicants in the improvement of

streets. Single men are to receive 75 cents per diem and heads of families \$1.25. All asking charity are to be put at work. If any refuse who are able to labor, they will be put in the chain-gang and worked separately, being paid no wages, but being provided with food and lodgings. Funds up to \$2000 per month will be expended for the relief of those out of work, but all the money is to be systematically applied to the improvement of the streets.

—The anxiety felt for some days in respect to affairs of the North American Navigation Company are at last set at rest, the requisite sum of \$100,000 having practically been raised by new subscriptions coming in and the old ones in many instances having been raised materially, while quite a number were doubled. The executive committee labored early and late to accomplish its purpose, with the result as related by one of its members.

—Mayor Carlson of San Diego, president of the San Diego, Yuma & Phoenix Railroad, has returned from Mexico, having secured the right of way through General Andreade's lands, and the most valuable concession granted by Mexico for years—the freedom from all taxes for thirty years. The road will run ninety miles in Mexican territory, and parallel to the big canal for forty miles. Eastern capitalists wired Carlson that the money was ready to build the road.

—Collector of Customs Howell, at Vancouver, B. C., has received a telegram from Sir Charles Hibbert Tupper, the Dominion Minister of Marine and Fisheries, instructing him to notify the sealers that it is likely the agreement with Russia regarding sealing will be renewed another year, the sealers consequently going into Russian waters on their own responsibility. The effect of this message has caused considerable comment in sealing circles, as a large number intended to go over to the Russian coast.

—The American Lumber Co., of Seattle, has carried a medal for three years, awarded by the Perkins Machine Company for the championship record of 156,000 shingles cut on a double block Perkins machine in a ten hours run. This record has been badly beaten by the crew of the Standard Mill Company, of Snohomish, Wash. The Snohomish boys recently cut 175,500 shingles on a Perkins double block machine in ten hours. This is certainly the championship record up to date. The crew of the McLeod mill at Edmonds, Wash., have a record of an average cut of 114,000 per day for twenty days.

—The report of Supervising Architect O'Rourke has been made public at Washington. It shows the following amounts expended and available on September 30, 1893: For the construction of public buildings on the Pacific Coast—San Francisco, \$193,768.82; Los Angeles, which has been completed, has still available \$128 88; Sacramento, \$4827. A site has been purchased for a building at Stockton, but no plans have yet been prepared. The appropriation for the building was \$75,000, of which there is yet available \$57,052.45. San Jose had available in September \$55,814 31. There is available on the building at Portland, Or., \$87,980.09, and none of the money appropriated for the Port Townsend (Wash.) building has been expended.

—It is stated on good authority that President Foster of the San Francisco and North Pacific Railroad has under serious considerations co-operation or amalgamation with a new Mendocino county railroad scheme. Under this plan the San Francisco and North Pacific Railroad would be extended from Ukiah to Eureka. There is at present a road twenty-five miles in length from Eureka southward, and the new road would connect with this. The scheme is not new and surveys have already been made from Eureka to Ukiah. The cost of construction of this road has been estimated at \$4,000,000. Humboldt county alone has offered a bonus of \$250,000. The scheme rests largely upon the result of the negotiations which are believed to be in progress between the Fort Bragg Lumber Company and the San Francisco and North Pacific Railroad. The railroad is anxious to carry the product of the Round Valley coal fields to San Francisco and also into the Sacramento valley. It may also offer to put the redwood of the Fort Bragg Company in San Francisco as cheaply as can the schooners.

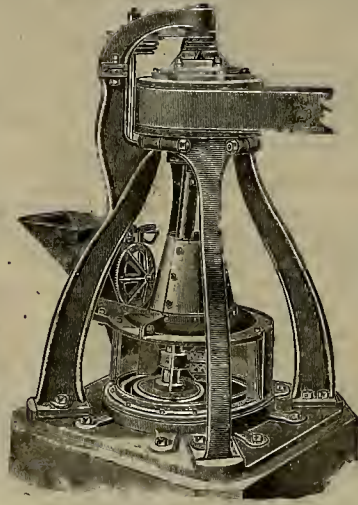
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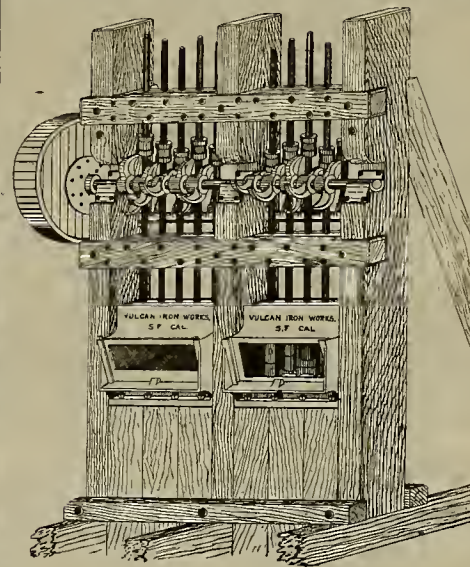
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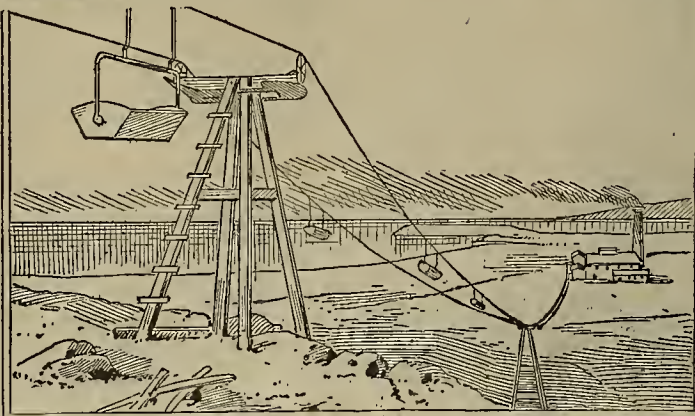
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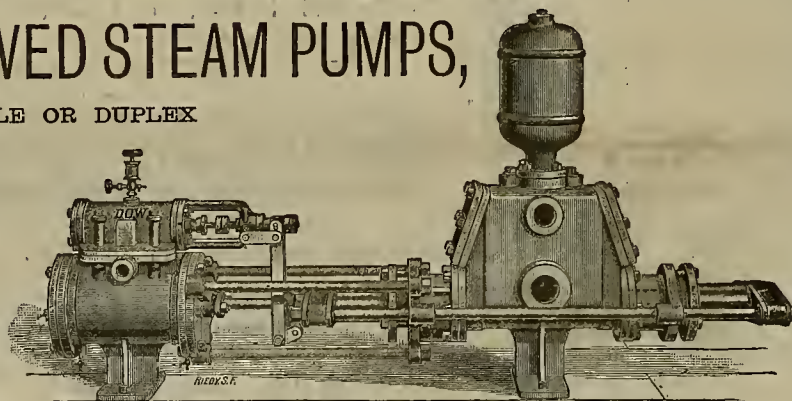
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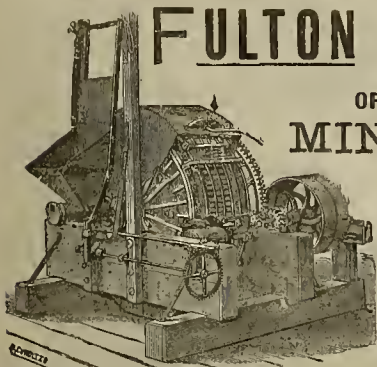
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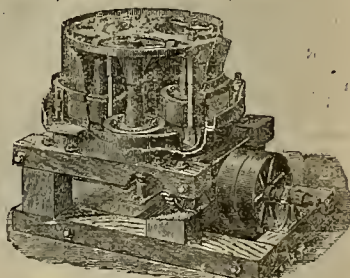
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VOLUME LXVIII.
Number 2.

SAN FRANCISCO, SATURDAY, JANUARY 13, 1894.

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Physical Features of the Mother Lode.

The two illustrations on this page are a continuance of the several views we have recently presented of mines and mills in Amador county, California. These are sample outcrops, such as are to be seen frequently along the mother lode. The upper plate shows a quartz outcrop at the Seaton mine, about a half mile north of the Gover. The lower plate shows an outcrop of greenstone forming the northeasterly termination of the Mayflower.

The topography, kind and amount of soil and vegetation on the mother lode are closely connected with the underlying rocks. The variations in the amount of erosion of different strata chiefly determine the topography, while its distinguishing features are governed by the strike, dip and faults of the strata. Vertical or steeply inclined rocks—either eruptive dikes or sedimentary strata—characterize the whole territory of the lode.

The four formations—granite, slate, serpentine and diabase—are each distinguished by a different surface and soil. The granite is characterized by a rolling surface and light, though fertile, soil. The serpentine, unless lying in a valley where it receives wash from other rocks, is uniformly distinguished by an almost barren surface, with little soil, no grass, and only a few stunted trees. Its rapidity of erosion is between that of the crystalline and the slaty rocks. The two formations to which the most important topographical features are due are the long, narrow bands of slates and the adjoining diabase dikes. The uniform conformability of these great dikes to the stratification of the sedimentary rocks, their hard and indestructible character, and their

juxtaposition with the soft, easily eroded slates, have given rise to those long, deep, narrow canyons leading down to each of the main rivers that cross the lode.

The black slates in their rapid erosion produce a light,

thin soil capable of supporting only growths of greasewood, manzanita and chaparral, and by this growth of brush they may be traced over the greater portion of their extent.

In Mariposa county only does the diabase occur in great amount—on the east side of the lode. There it forms the Mt. Bullion range. On the west several mountains and ranges are conspicuous features of this rock. Where its surface is not too rugged, it produces the best of soil.

It is stated that the Gem mine, at Wallace, Idaho, has again closed down because of the low price of lead and silver. About 50 men are retained, however, to clean up the ore in the chutes and on the floors and this will probably supply the concentrator for a week or two, after which the remainder will be discharged with the exception of 20 to 25 men, who will be kept to blast out a chamber on the lower level preparatory to sinking a shaft from that level at a distance of nearly 1500 feet from the mouth of the tunnel. The time has now come when further development of this great mine must result in changing it from what is generally known as a "tunnel mine" to a "shaft mine," as the reserves are largely worked out above the level of the lower tunnel. The *Spokane Review* thinks this must shortly be the fate of the Frisco, Bunker Hill and other important mines of the Cœur d'Alenes, provided that their future development is faithfully prosecuted. The greater elevation of such mines as the Mammoth, Standard, Morning, Granite and others similarly situated, will permit of their development for many years by the less expensive method of tunneling. None of these mines are able to work at a profit with silver at 68 cents and lead at \$3.20 per hundred.



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CONTRARY to expectation, the miners of Slocan district, B. C., do not regard the probable changes in the lead tariff with unmixed satisfaction. They believe that the cheap Mexican ores will force the price of lead down to nothing, and the smelter charges, which at present are quite reasonable, will be increased materially. The Slocan ores are now in demand for fluxes, a condition which would not obtain in an era of free ore and importations from everywhere. The fact is, they say, that Slocan ores can very well afford to pay the present duty, because they are high grade, and yet they can't bear competition with ore from Mexico.

GRASS VALLEY will speedily recover from the blow inflicted by the fire at the Idaho-Maryland. It is announced that the work of reconstruction will begin immediately. New machinery will be installed, if the old is damaged beyond repair, and the water which will inevitably accumulate in the mine will be taken out as soon as possible. It is a serious matter for 225 men to be thrown out of employment. But partial compensation will be found in the employment of many men in the work of rebuilding; but if this is not satisfactory, complete consolation should be derived from contemplation of the escape of all the imprisoned miners without the loss of a single life. The matter might easily have been infinitely worse.

THE Debris Commissioners have ordered the temporary suspension of hydraulicicking at the Polar Star mine, Dutch Flat, Placer county. The inspectors found that the impounding dam was not accomplishing the purpose for which it was built. The water was carrying off too much sediment on account of the soft character of rock being worked. Operations are ordered suspended until the dam can be raised. It is possible that the action of the Commission in this case will assure the valley people that the Debris Commission is not an organization created to promote the interests of the miners more than the farmers. Its purpose is to allow the resumption of mining wherever practicable and without detriment to adverse interests. The Commission is doing its work faithfully and well.

VERY SERIOUS FAULT has been found with a newspaper in the Comstock because it published a statement that 800 men were employed in the mines and related industries. The total is something less than 600. It does no good either to conceal or exaggerate the truth about such matters. Misrepresentation is certain to prove a boomerang. It is not desired to offer any sort of inducement for miners and others to go to the Comstock seeking employment, and any publication leading to that end is bitterly resented by the already large list of unemployed.

The Rewards of Drift Mining.

One of the most valuable papers recently contributed to contemporaneous mining literature was read before the Technical Society in this city last week by Ross E. Browne, M. E. The subject was the "Red Point Drift Gravel Mine," and the paper was prepared by Charles F. Hoffman, M. E., superintendent of the mine. A fine illustration of economical management is afforded in the operation of this mine, the details of which are fully set forth by Mr. Hoffman. A full abstract appears on another page.

It takes a high order of engineering skill, coupled with accurate knowledge of geological phenomena, to locate a hidden ancient river bed with certainty, and it likewise requires ability of scarcely less pronounced description to develop it successfully and economically. It is true that very many of the river beds have been found to contain vast quantities of gold, and the mines have been profitable even when crude and expensive methods of development were employed. But often the gold is scattered widely and impartially through the cement, high pay streaks being infrequent, and the development of the mine must proceed on strictly business principles. The Red Point mine is a case in point. The average per carload for five years was \$2.20, the average expense of production, including ventilation, transportation, labor, materials and management, was \$1.64 per carload. If we deduct from this interest on the original investment—a vast amount that was expended before pay gravel was struck—we find the profit not at all incommensurate with the risk undergone. Drift mining is all prospecting until the channel is found. Machinery must be secured and placed in position, and long tunnels run—development by shaft being more or less infrequent—and often thousands of feet of dead work done, and months and even years of labor expended before the actual operation of the mine can be undertaken.

In the early days of drift mining the rewards were not always sufficient offsets for the risk. Knowledge was inadequate and experience primitive. But in the modern days of the industry the location of a channel has become an exact science, and few errors are made. The existence of a lava-capped auriferous channel can be determined with certainty, and its location can be ascertained with close approximation by the employment of engineering skill, geological knowledge and common sense. Russel M. Dunn, M. E., declares it possible to determine the following in advance of doing any underground work on the claim:

1. The approximate location of the line of the bed of the channel.
2. The approximate elevation of the bed at any desired point.
3. The location of inlets, outlets or breakouts, and a reasonable certainty of distinguishing between them.
4. If inlet, outlet, or breakout, the probable length of rim to be run through and the depth at which it must be penetrated.
5. If no inlet, outlet, or breakout, then the nearest point of the channel line to the surface for tunnel or shaft, as may be most desirable.
6. The determination of the size of the channel and the probable extent of its pay lead. This being of advantage in estimating the probability of yield sufficient to warrant the necessary outlay of capital in development.
7. The tunnel or shaft can be so located as to have the shortest possible length or depth with the greatest possible certainty of finding the channel, and of thereafter being permanently utilizable for working the mine.
8. The preceding make it possible to estimate in advance the probable expenditure that will be necessary to open up the mine, and to avoid any unnecessary expenditure, thus assuring the greatest possible economy both of opening and of working.

The pioneer history of drift mining in California is a record of miraculous successes and pyrotechnic failures; its recent record is in the highest sense creditable to the engineers and miners who have sought to eliminate from the industry the element of speculation and give it a basis of certainty. They have brought to the task experience, industry, technical learning and prudence. They have deduced certain formulæ from observed facts, and have applied them, with variations to suit local conditions, with the most satisfactory results. The risks of capital which invests in this class of mining property have been reduced to a minimum. It can be estimated with sufficient safety just what outlay will be required before returns are made. Just as few investments in this class of mining are now unremunerative as in any other branch of business; and the rewards are often very much greater.

ONE more abandoned mine in California has been redeemed from idleness and placed on the list of producers. From the Reward, in Nevada county, which was idle for many years, have just been taken an initial 100 tons of ore, which yielded \$23.50 per ton. The cost of mining was about \$6 per ton. When the mine is in operation and a mill in place, more economical methods can be applied, and the Reward will be a permanent dividend-payer. There are many other mines in California with which the same thing may be done.

The Alta Company's Troubles.

The affairs of the Alta Mining Company are about to be ventilated in the courts. They abound in disclosures which contain startling charges of mismanagement and fraud, through which it is alleged the stockholders were mulcted in the sum of \$300,000. Papers have been prepared for a suit for accounting by certain shareholders against Treasurer Charles Derby and five Boards of Directors. The complaint is based on a report made by Expert George W. Reynolds, who was engaged for this duty by the new President, John Landers, and his co-directors. The management of the mine and its correlative company, the American Milling Company, was for years centered in the late Seth Cook, aided by his lieutenant, Charles Derby. George R. B. Hayes, attorney retained by the Directors, makes the following statement: "Reynolds' report shows that Cook was indebted to the company in \$70,000 for moneys which he drew and charged to himself. So lax was the management of the company afterward that no claim for this sum was presented against his estate, which was valuable. The estate is now settled up and divided among the heirs, so that this sum is hopelessly lost.

"The sum taken from the company in coin, as shown by the expert's report, will probably reach \$300,000. This does not include losses by a fraudulent lease. High salaries were paid out of all proportion to the labor performed, and entirely unauthorized by the by-laws.

"Cook and his associates organized among themselves a milling and mining company, and as officers of the Alta Company leased the mine to the new corporation for a nominal sum. It was a very close corporation. Cook let some of his directors into it without their knowledge. One director, whom I can name, when he was tendered the first dividend from the new enterprise remarked, 'I own no stock in that company, and this money isn't mine.' He was told to take the dividend and say no more about it. He obeyed orders. Until some of the men who came in for a share of the profits are placed on the witness-stand the amount thus diverted from the mine cannot be known.

"Then there is a big shortage in the bullion output. The books of the company show that the shipments from the mine were largely in excess of the amount received and accounted for by the San Francisco office.

"Derby succeeded Cook as general manager of the concern, and by some 'hocus-pocus' transferred the \$70,000 indebtedness to himself. This he increased to \$80,000."

Answering an inquiry as to the probability of the stockholders being able to recover any considerable part of the funds and bullion, Mr. Hayes said it was slim. Derby has a ranch in Nevada, but it is incumbered by a mortgage.

"Still he may have stowed some money away," remarked the lawyer, "which the company could get hold of. The directors are individually responsible for the losses, whether they are participis criminis or only guilty of gross negligence. There will be no trouble in proving that they were guilty of the last charge. The estate of Cook now being free from attack, I question whether the combined possessions of four or five Boards of Directors will suffice to make good the actual losses to stockholders by mismanagement and worse, even if judgment can be obtained against them."

Death of John H. Dall.

John H. Dall of this city, in former years widely known throughout California and Nevada in connection with mining affairs, died at his rooms in the Palace Hotel on Tuesday last, aged 75 years. The later generation of miners knew little of Mr. Dall, but old-timers will recall his connection with operations on the Comstock, and his great reducing establishment at Franktown, in Washoe valley. He was among the earliest of the Argonauts, and the large heart and the open ways of California's golden age never ceased to be reflected in his life and manners. Finely endowed with native sense, rich in the primary elements of manhood, strong in energy, sincere, brave and kind, John Dall was, as he deserved to be, ever universally respected; and to those who knew him well, he was very dear. His death came in the order of nature, in the fullness of years and after his life's work had been manfully done. It is noble thus to live; it is blessed thus to die.

THE Debris Commission has issued a permit to the Green Mountain mine, Mokelumne Hill, to resume hydraulicicking. An impounding dam has been constructed, as required.

THE Midwinter Fair will be formally opened Saturday, January 27, 1894.

Work of the Debris Commission.

The records of the California Debris Commission up to this time show that thirty-seven hydraulic mines have made application to mine under the Caminetti Act, ten have been granted licenses, and none have been formally rejected. Besides these a considerable number are going ahead with the construction of dams, which, if built according to plans submitted to and approved by the Commission, will insure the issuance of a permit. There is at present no good reason to believe that nearly if not quite all the mines in the appended list will not be in successful operation during the present year. The Commission has proceeded with its work cautiously, but on the whole wisely and satisfactorily; and it is undeniable that the Caminetti Act is day by day gaining strength with the miners.

The formalities through which it was necessary to go were for some time matters of objection to miners; but they are after all easy to comply with. The expense is light, and the applicants are assured of a fair and impartial hearing.

It has been stated that the mines which it was possible to operate under the law were all small, and that none of the large would resume, but it is obvious from the following that large as well as small mines secure the benefits of the Act. Several mines with impounding dams of considerable capacity have been allowed to start, and the list includes others of large size, which will doubtless be allowed to resume.

The Debris Commission has been actively at work since July, but its first public session was as late as September 4th. In the four months since then it has performed the bulk of its work. Under all the circumstances the results are satisfactory and full of promise for the future. Undoubtedly a great deal will be done during 1894, as it may be expected that many more mines will make application during the year.

The list of mines which have applied, with other information of interest, is appended:

Kelly Hill mine, Butte county; owned by Mooser & Boyd of San Francisco; dam of rock, brush and earth; capacity, 200,000 cubic yards; license granted ———, 1893.

Farrel mine, Nevada county; owned by the Eureka Lake and Yuba Canal Company (Consolidated) of Nevada City; dam of earth and logs; capacity, 212,000 yards; license granted September 8, 1893.

Omsa mine, Nevada county; owned by N. C. Tully of Stockton; dam 80 feet high in Scotchman creek; capacity, 1,000,000 yards.

Richmond Hill and Saw Pit Flat mine, Plumas county; owned by the Good Hope Mining Company of Oakland; rock dam in Onion Valley creek.

Brandy City mine, Sierra county; owned by A. Steinhager of San Francisco; brush and earth dam across mouth of old hydraulic pit; capacity 1,940,000 yards.

Blue Nose mine, Plumas county; owned by B. Below of Oakland; stone dam in Hopkins creek; capacity 50,000 yards.

Blue Gravel mine, Yuba county; owned by the Excelsior Water and Mining Company of Smartsville; old hydraulic pit tunnel stopped with rock; capacity 2,885,000 yards; license granted October 12, 1893.

Illinois Gold Gravel mine, Plumas county; owned by H. Buckley and Louis L. Hillman of La Porte; old hydraulic pit tunnels stopped with rock; capacity 35,000 yards.

New York Gold Gravel mine, Sierra county; owned by Westall & Hughes of Sierra City; brush, log and earth dam in Howard creek; spillway in creek; license granted December 5, 1893.

Corbiere & Bean mine, Butte county; owned by Corbiere & Bean of Clipper Mills, Yuba county; rock dams ten feet high in Hampshire creek; capacity 2000 yards; license granted November 20, 1893.

Phoenix Gold Gravel mine, Sierra county; owned by W. A. & M. E. Schofield of Hepsidam; dam in Whisky creek and north fork of Skate creek.

Eureka Mining Company, Downieville, Sierra county; dam of timber in Sawmill ravine.

Craycroft hill placer mining claim, Sierra county; owned by the Craycroft Mining Company; dams of timber in Hughes and Davidson ravines.

Excelsior hydraulic mining claim, Sierra county; owned by Excelsior Mining Company; dams of timber in Eagle Gulch and Smith's Flat.

Spanish Ranch, Plumas county; owned by W. C. Ralston of San Francisco; dam of timber in Spanish creek; spillways in old hydraulic pit; capacity 4,900,000 yards.

Polar Star mine; owned by John Spaulding of Dutch Flat; stone and gravel dam in Little Bear river; capacity, 605,000 yards; license granted December 13, 1893.

A Denmire dam, Sierra county; owned by A. Denmire; dam in dry ravine; capacity, 3100 yards.

Nevada mine, Sierra county; owned by Geo. W. Cox of Table Rock; dam on north bench of Slate creek; capacity, 6000 yards.

'54 Flat mine, Amador county; owned by '54 Flat Mining Company of Sutter creek; brush dam in ravine.

Red Hill mine, Shasta county; owned by Nathan Gardner of Ono; five dams in gulch; capacity, 900,000 yards.

Badger mine, Shasta county; owned by W. R. Stewart of Igo; dam on flat ground; license granted January 2, 1894.

First Chance mine, Sierra county; owned by Frank E. Barberio of Sierra City; bowlder, log and brush dam in

Howard creek; capacity, 8630 yards; license granted January 2, 1894.

Tannery Ravine mine, Yuba county; owned by W. R. Reed of Brownsville; log and brush dam in ravine; capacity, 4000 yards.

Mateos mine, Sierra county; owned by Manuel Mateos of Sierra City.

Davis mine, Sierra county; owned by Joseph Davis of Sierra City; license granted January 2, 1894.

Christmas Hill mine, Placer county; owned by McKinstry & Gilbert of Butcher ranch.

Walker mine, Shasta county; owned by Alonzo Engle and Frank Walker of Igo; ore, rock and four brush dams in Pomeroy creek.

North Star mine, Calaveras county; owned by McGuire & Havens of San Francisco; dams in gulch.

Hustler mine, Nevada county; owned by Joseph Hustler of Patterson; existing drain in Kilroy creek; capacity, 210,000 yards.

Green Mountain mine, Calaveras county; owned by J. W. Smith of Oakland; brush dam; capacity, 170,000 yards; license granted January 8, 1894.

Noonday mine, Sierra county; owned by John Egbert of Sierra City.

Pomeroy mine, Shasta county; owned by John McGrew and Alonzo Engle of Igo; rock dam in Pomeroy gulch.

Union mine, Plumas county; owned by Daniel W. Albert of Brownsville, Yuba county; rock and brush dam.

Welch placer mine, Sacramento county; owned by Columbia Gold Mining Company of Michigan Bar; stone dam; capacity, 300,000 yards.

French Corral mine, Nevada county; owned by the Kate Hayes Mining Company of San Francisco.

Manzanita mine, Nevada county; owned by the Kate Hayes Mining Company of San Francisco.

Campo mine, Yuba county; owned by Tonatino Campo of Brownsville; rock dam.

Slickens.

SPOKANE WANTS A SMELTER.

A new camp, christened Gold Bug district, is the latest to claim public recognition. The new camp is situated about seven miles west of Baker City, Or.

MINING ASSESSMENTS falling delinquent in January amount to \$151,840, of which Nevada mines call for \$136,340, California mines \$5500 and Mexican mines \$10,000.

It has been definitely decided that Idaho will make no exhibit at the Midwinter Fair. There are no funds available, and it is impracticable to secure private subscriptions in sufficient amounts.

THE Miller and Holmes Mining Company invites proposals for sinking their shaft on the property of the company at Quartz mountain, Tuolumne county, to a further depth of 100 or 200 feet. E. A. Stent is superintendent.

THE big Butte & Boston Company at Butte, Montana, is now working ten per cent more men than were ever before on its pay roll, and there is no doubt whatever that the present year will witness no diminution of its force.

A BITTAR war between the union and non-union men at Deadwood has begun. Three hundred members of the Union drove 130 "scabs" from the mine of the South Dakota Mining Company, on Anna creek, to Deadwood. Further trouble is expected.

THE Tidings, at Grass Valley has been leased to A. B. Champion and James C. Tyrrell. Mr. Champion has for several years been editor of the Tidings, and is an excellent newspaper man. Mr. Tyrrell is also well known in Nevada county as a newspaper man.

THE Occidental Aluminum Company has been incorporated. Principal place of business, San Francisco. Capital stock, \$500,000, with Albert H. Statham, W. S. Barton, W. J. McFarland, San Francisco, M. T. Cavanaugh and J. E. Norris of Eureka, Nev., as directors.

IN 1893, 78 mining assessments amounting to \$2,196,280, were levied against 81 assessments, amounting to \$2,566,320, in 1892. Of this year's assessments California mines want \$253,000, Nevada mines \$1,828,280, Arizona mines \$45,000, South Dakota mines \$50,000 and Mexican mines \$20,000.

SEVERAL Colorado towns have recently bid \$50,000 and over for the Corbett-Mitchell fight. In California it is a matter of most sacred conviction that Corbett is a 100-stamp battery in a mill. Who is the Munchausen, anyway, that has been libeling Colorado with his idle talk about hard times?

THE Yellow Jacket mine, in Lemhi county, Idaho, has under consideration a project to put in a 100-stamp mill in the place of its present one of 10 stamps. The Yellow Jacket is a free-milling ore with an ore seam running from 40 to 50 feet in width. The retorts are disposed of at the Denver branch mint.

THE Providence Gold Mining Company at Nevada City has filed articles of incorporation with the Secretary of State. The principal place of business is at San Francisco. The capital stock is placed at \$250,000, and Joseph Butzenbach, Peter Tautphaus, E. F. Liebrich, F. Boeckman and W. H. Wideman are directors.

It may not be amiss to call attention to the fact that the period within which notices must be filed of intention to take advantage of the assessment suspension law expired December 31, 1893, and that those claims upon which assessment work was not performed in 1893 are subject to relocation, provided no such notice was filed.

"JIM" WARDNER, from whom the town in Idaho was named, has arrived at Johannesburg, South Africa. He writes back that he has met John Hays Hammond, S. B. Connor and U. C. Clement. Clement is managing the Primrose mine; has 1800 colored men working for him and 200 whites. The Primrose paid a \$50,000 dividend in October.

MERRITT BAOS, Duluth capitalists, have bonded 2500 acres of placer ground along the Snaks river, near Grand View, Idaho, owned by Joseph M. McAfee and others, for in the neighborhood of \$100,000. The intention is to at once put in extensive machinery and develop the property vigorously. It

is said, with the machinery it is proposed to purchase, the total investment will aggregate over \$200,000.

THE stockholders of the Eureka Tellurium Gold Mining Company (Shasta county) met on the first of the month and elected as directors: E. A. Zoellin, F. B. Simonds, Philip Scherer and Peter Scherer, Redding, and S. W. Powell, E. C. Selfridge and C. A. Taber of San Francisco and Oakland. The directors then met and elected P. Scherer, president; C. W. Taber, vice-president; G. C. Jones, secretary, and the Bank of Northern California, treasurer. P. Scherer will continue as manager.

THE annual meeting of the San Francisco Stock and Exchange Board was held January 8th. Colonel William Edwards was elected president. Colonel Edwards last year served as vice-president. A. F. Coffin, the president last year, retires. A. B. Ruggles was elected vice-president. The other officers were unchanged, O. V. Walker being elected chairman, Geo. T. Marye treasurer, and F. W. Hadley secretary. The following Committee on Membership was elected: Geo. C. Hickox, James Paterson, H. H. Shinn, J. E. Dyer, Chas. D. Laing, J. R. Fitch and Charles H. Stoutenborough.

CAPTAIN O'BRIEN states that if the tariff on quicksilver is removed the New Almaden mines will have to shut down, as it will be impossible to compete with the European product. Even with the present duty on quicksilver it will be possible only to employ the men half-time during the winter owing to the general depression, but if the duty is removed altogether all the miners will be reduced to absolute want, with no means to provide for the support of their families.

PETER SMITH of Vancouver, B. C., has invented a mineral locating machine that fairly distances the divining rod as a finder of treasure. According to the highly lucid accounts received from Vancouver, "it resembles a wooden box with a tin fog-horn sticking through a hole in one side and suspended from a string within the box." Thirty dollars in silver was the other day buried near town, and the machine guided Smith—so we are told—to within 600 yards of the treasure. It was getting dark, and his friends then steered him to within 200 yards. The machine made a singular noise, and after a variety of maneuvers the silver was finally successfully located.

THE San Francisco Call has a very able editorial on the "Mining Product" of the United States, based on the recent statement of the Director of the Mint of the output for 1892. Unfortunately the Call assumes that the figures are for 1893, and rejoices that the industry is in such healthy condition, "notwithstanding the alleged disturbance in the silver mining industry caused by the silver controversy." Returns already at hand show that the silver agitation did have a tremendous effect on the silver mines, and that silver, lead and copper will show a heavy falling off. The year 1893 was not a banner year for these branches of the mining industry.

THE Treasury Department presents a table showing the monetary systems and approximates of stocks and money in the aggregate and per capita in the principal countries of the world. The list is:

Belgium.....	\$36 81	Germany.....	\$18 56
France.....	26 70	Portugal.....	21 06
Australia.....	26 05	Egypt.....	19 85
United States.....	26 02	South American States.....	19 67
Netherlands.....	24 34	Canada.....	10 00
China, all in silver.....	1 80	Cuba.....	12 31
Roumania.....	4 60	Italy.....	9 59
Servia.....	4 27	Switzerland.....	14 48
Sweden.....	2 71	Greece.....	12 22
Turkey.....	2 39	Spain.....	17 14
Central American States.....	3 78	Austria-Hungary.....	9 59
Japan.....	4 00	Norway.....	6 60
India.....	3 44	Denmark.....	11 72
Hayti.....	4 90	Russia.....	8 17
United Kingdom.....	20 44	Mexico.....	5 00

Since the statement was tabulated the United States has decreased to \$25.55. The table puts the stock of gold money at \$3,901,900,000; silver, \$3,931,100,000; uncovered paper money, \$2,700,000,000.

Foundry Notes.

THOMAS MCGLEW is at French Gulch, Madera county, putting in three concentrators at the mill of Spencer & Sharp.

THE 13-inch gun recently completed for the battleship Oregon at the Washington Navy Yard is the largest that is made in this country, and there are not many more that will be made of this size. It requires a charge of 550 pounds of powder and throws a shell weighing 1100 pounds a distance of 13 miles at the extreme elevation. At point-blank range it will penetrate 26 inches of solid steel. The gun in its finished state weighs 65 tons, but when mounted it can be moved throughout its extreme range with the pressure of a single hand. The steel of which the gun is made is known as gun steel and is the very toughest that can be produced. The mountings are from the Bethlehem Iron Works and will have to undergo inspection by a rigid board of army experts before they are accepted.

THE Joshua Hendy Machine Works has constructed and is proceeding with the erection in the Mechanical Arts building, at the grounds of the Midwinter Exposition, a five-stamp quartz mill which will be complete with all of the latest improved accessories of a Hercules rock breaker, Challenge ore feeder, Triumph concentrator, silver-plated plates, etc., and which is intended for practical operation upon such gold-bearing quartz ores as may be offered for crushing and amalgamating during the continuance of the exposition. They will also place on exhibition in conjunction with the above, a full line of their specialties of hydraulic mining machinery, comprising hydraulic gravel elevators, giants, water gates, pipe, air valves, etc., and, as well, horse whips, ore buckets, mining cars and such other paraphernalia as is essential to the proper conduct of enterprises involving the mining and milling of quartz ores and mining by the hydraulic system. They will also exhibit another of their specialties of lap-welded wrought-iron tubing, coupled with patent lead-lined couplings, for use as water pipe for irrigating, farm, dairy and other purposes, and will also place in operation a Russell automatic and an Ore & Sombower engine as power for certain departments of the exposition, for which they are agents. We are informed that these works were awarded premiums for exhibits at the Columbian International Exposition at Chicago, of ore feeders, Triumph concentrators, hydraulic gravel elevators, giants, etc.

The Official Report on the Olympia.

The government trial board has passed judgment on the cruiser Olympia, on her recent performance in Santa Barbara channel. She is officially credited with 21 686 knots, or 1.686 knots above requirements. The bonus to the builders will be \$300,000. The report of the trial board is complete in all essential particulars, but there are minor matters which must be passed on when the cruiser is fully completed and equipped, which will not be for several months.

The plans and specifications have been more than complied with in every point of machinery, speed, horse-power and coal consumption. From the report of the trial board, it appears that at the beginning of the trial the draught forward was 19 feet 7 inches, and aft it was 22.2. Coal consumption during the run reduced it to an even 19 feet forward, after the trial, without any change aft, giving a mean draught during the trial of 20.85. The mean displacement during the run amounted to 5570 tons, when only 5500 was called for by the contract.

The required pressure test was 160 pounds; at the boilers 166.53 was shown; at the starboard engine's steam chest the register was 166.75, and at the port engine's, 164.83.

On a requirement of 16,000 the main engines' indicated horse-power was as follows: Starboard, H. P. 2001; 1st, I. P. 3097.3; L. P. 3198.5; total, 8297.6; port, H. P. 1903.2; 1st, I. P. 3185.6; L. P. 3463.4; total, 8552.2; grand total for main engines, 16,849.8. The collective horse-power of the main and auxiliary engines operated during the trial amounted to 17,313.08.

Under these conditions of steam and power the furnaces ate up 39 937 5 pounds of coal per hour during the run; the starboard engine made 139 98 revolutions per minute, and the port 138.53; the starboard blower revolved 470 times per minute in creating forced draft, and the port blower 475 times. The slip of the twin propellers proved nearly as diversified as the performance of the starboard and port engines. Based on the mean pitch, the slip of the starboard wheel was 17.4 per cent of its own speed, and on the final pitch 21.50 per cent. Through the port screw the slip was 16.5 per cent on the mean pitch and 20.6 per cent on the final pitch.

It will take from seven to eight months to put the finishing touches on the Olympia so that she can be declared in commission.

Labor on the Comstock.

The total number of men now employed on the Comstock, including mines, mills, the Sutro tunnel, and the railroad, light and water companies, is 528. A controversy over the matter recently arose in Virginia City, and the *Chronicle* went to the trouble to ascertain the facts. The monthly payroll is taken as the basis of estimate, superintendents and office clerks being excluded. The payroll for the month of December shows that \$60,844.25 was expended for labor done during the month by the mines, the water and gas companies, the Nevada mill and the river mills. The share paid by the mines was \$47,844.25. The payroll of each mine is from the sworn statement of the secretaries and is authentic and reliable. There were 31 days in last month, and taking the average wage per day at \$4, the sum shows 386 men all told employed by the mines above and below ground, exclusive of superintendents and office clerks.

In order to ascertain the number of men employed underground, the Con. Cal. & Va. mine, the leading mine on the lode, may be taken as a basis of estimation. In the mines which employ the most labor there are generally more underground employees than top men; in the smaller mines the reverse is true. According to figures taken from the company's books by Chief Clerk Lowell, there are 97 employees above and below ground at both workings of the Con. Cal. & Va. mine. Of this number 52 are employed underground and 45 above. The division is almost equal. In addition to this there are 12 men employed underground by the West Consolidated Milling Company, making the total number of employees of the two companies 109. It has been stated that there are 170 employees in the Con. Cal. & Virginia. This is a mistake.

The proportions leaning the other way in the smaller mines divide the above and underground employees about equally. This being the case, it is easy to estimate the number of the latter from the payroll. The half of \$47,844.25 is \$23,922.12. The average wage underground is over \$4. Estimated at \$4 there are 193 underground employees on the Comstock. If the estimate is made at 60 per cent instead of 50 per cent, the number is brought up to 231. This is the outside number that can be estimated from the payroll, and from the cold figures furnished by the leading mining company on the Comstock.

Figures from the railroad company show about 25 men

employed between Virginia and the Mound House at an average of \$4 per day. There are about a dozen men employed on the Sutro tunnel. At \$4 per day, the light, water and mill companies employ about 103 men, as shown by their estimated payrolls, which are at top figures. The total number of men employed by the mines, mills, the Sutro tunnel, and the railroad, light and water companies, at the outside, is therefore about 528.

Fire at the Idaho-Maryland Mine.

The hoisting works at the Idaho-Maryland mine, at Grass Valley, California, were totally destroyed by fire Tuesday night, January 9th. The loss is about \$60,000; insurance in all surface works, \$32,000.

The fire was discovered about nine o'clock. The flames burned rapidly, and there ensued a scene of anxiety and consternation such as has never been witnessed in Grass Valley before. Hundreds of people rushed to the scene of the conflagration. Mothers, wives, sisters and brothers went out to the mine to get tidings of those who were working away down in the depths.

There were about 80 men in the bowels of the earth, and for a time it seemed as though they would all perish. The flames from the immense hoisting works were roaring and crackling, and gas was coming up from the old pump shaft, and then it seemed as though the men beneath the surface would surely meet a terrible death.

Three or four brave miners from above, who had assembled, went down the air shaft to warn the men below that the hoisting works were on fire, and told them to run for their lives. The utmost order and coolness seemed to take possession of the men underground, and with the precision of soldiers they made their way to the air shaft.

After a lapse of about an hour and a half, during which there was an age of agony on the surface, a mighty shout went up from hundreds of throats. The shout was one of joy, and fairly shook the surrounding hills. The first man had come out of the shaft. He announced that all were safe below. Women ceased their weeping and men regained their composure when they knew that all was well below.

Slowly and surely the men climbed the perpendicular ladder for the distance of nearly 2000 feet, and got to the surface almost exhausted. The hoisting works were burned to the ground, and the splendid machinery contained therein is ruined. It is supposed that the fire originated in the dryhouse, which is partitioned off the hoisting works.

The work of clearing away the debris has already begun. To what extent the machinery is injured will be known tomorrow. The work of replacing the defective machinery and the erection of hoisting works will be prosecuted as fast as possible, and if the necessary lumber can be procured and severe weather does not interfere, everything will be in good working order in about 60 days. Meanwhile, about 225 men are thrown out of employment, and the majority of them must remain idle until the work of reconstruction is ended. The shaft is not injured below a depth of 20 feet, so no time will be lost in reopening it. The old pump is forcing water from the 1000-foot level, but below that depth it cannot be handled, and the bottom of the mine will consequently fill up. It is the current belief that the burning up of the mine's plant will delay the transferring of the property to the Maryland Company several months.

The formal opening of the Colorado Gold Mine at the Midwinter Fair took place last Wednesday with appropriate ceremonies. The entire press of San Francisco had been invited to be present and many responded. Addresses were made by W. S. Chapman, W. C. Ralston and S. K. Thornton of this city and by William Keast, R. V. Robertson and others of the gold mine. The chief feature of the exhibit is a cross-sectional view of a mine in full operation with surface works, including hoisting works, mill, whim and ropeway. The working model is from the Saratoga mine, Gilpin county, Colorado, and is very ingenious. Other things are a tunnel and a shaft with a hoist. The various appliances for the working of a mine are fully displayed, so that a very complete idea of mining operations is given.

The Kennedy mine, Amador county, which in 1892 held the belt as the largest producing mine in California, was surpassed during 1893 by the Utica, in Calaveras county. The exact figures for the Utica are not yet obtainable, but it is known that for three months the production was close onto \$500,000; and in December alone the output was upwards of \$200,000. The Kennedy, in 1892, yielded \$443,000. During the year just passed this record was considerably surpassed, the total being \$640,000, of which \$480,000 was paid out in dividends. It is evident from these things that the mines of California are on the up-grade. The Utica is a particularly fine example of what has been done with an abandoned mine; and what has been done can be done.

The Nance Double-Acting Cornish Plunger.

The Cornish double-acting pump patented by Wm. Nance, of Grass Valley, and in operation there for about a year, presents a variation of the established system that will be of interest. The following description is furnished by Mr. Nance:

"This pump being double acting, it is evident that it lifts the column of water on the up-stroke and forces it on the down-stroke, producing a continuous discharge of water, instead of an intermittent discharge on the down-stroke only. The pump, column and main rod are only half the size of the old pump for raising the same quantity of water. The essential difference in the rod is that it is strengthened by two iron plates the whole length of the rod instead of plates on the joints only, which enables the rod to lift twice the weight of the column of water on the up-stroke, whilst on the down-stroke it is only just heavy enough to force the column of water, so that the weight of water lifted on the up-stroke is the same as in the old pump for the same quantity of water, only it is done with a rod half the weight and size. In fact, it may be considerably less than half the size, being governed by the thickness of the plates; but it must be half the weight. The engine is balanced in precisely the same way as it now is. The importance of this great reduction in the weight of the rod will be easily appreciated, especially when you consider the weight of a 12-inch rod 2000 feet long is 50 tons, exclusive of iron work, connections, etc., which bring it up altogether to about 65 tons; and it is obvious that to run this ponderous weight up and down the shaft without lifting any water would require a very considerable amount of power; that is to say, a very large percentage of the power must be absorbed in overcoming the friction and inertia, 50 per cent of which is evidently done away with by reducing the weight of the rod one-half, while at the same time it is also evident that it reduces the wear and tear on the pulleys and bearings 50 per cent and that pulleys half the weight suffice to do the work.

"In the pump itself provision is made to prevent chambering the cylinder, both ends of which are bell-mouthed, so that at each end of the stroke the piston ring enters slightly the enlarged ends; and to compensate for the creeping down of the main rod by the wearing of the brasses on the top end of the rod, an adjusting screw is provided so that the piston can always be kept in the same position by a little attention and the chambering entirely prevented. The arrangement which renders it impossible for sand to get into the pump renders it practicable to use metal rings for packings on the piston. Soft iron has been successfully used, but almost any kind of soft metal may be used with soft packing on the inside to press the rings close against the sides of the cylinder after they become worn a little. Lead hardened a little with tin or copper answers very well, and the old rings go to help make new ones. The iron rings last about a year and the cylinder, as far as I could judge, would run about five years before it would require boring out or just as long as a pole lasts in the under shaft.

"The arrangement for taking the weight off the stuffing-box and preventing the piston bearing hard on the bottom of the cylinder in diagonal shafts does away with a great deal of uneven wearing of the piston, cylinder and stuffing-box, as well as a great deal of friction, the piston being carried straight in the center of the cylinder. By the use of these pumps and utilizing the full effective pressure of the water power, a saving of about one-third of the power now used can be effected."

Mr. Nance advocates the use of hydraulic engines in connection with these or any other pumps, because "they give a direct acting straight pull in a line with the rod, doing away with all pulleys, shafting, cog-wheels, sweep rods and the objectionable pulling and pushing motion which tries the foundation so severely. The first outlay for the hydraulic plant would be much less than for other plants. For instance, where there is a water pressure of 300 pounds per square inch, a 20-inch cylinder would lift 90,000 pounds or work 12-inch pumps (single acting) 1500 feet deep perpendicular and require less attention than the rotary arrangement."

AMONG subjects to be discussed at the forthcoming session of the Trans-Mississippi Congress in this city, February 18, are the silver question, irrigation, arid lands, public lands, mining laws, the policy of the Secretary of the Interior, Pacific and Gulf coast harbors and the Nicaragua canal. Its object is to inform the national Congress of the views and needs of the West. It has already had a distinct influence on legislation at Washington, and at each session its influence has been increasing. It is hoped that at the next Congress the Governors and Congressmen of the twenty-two trans-Mississippi States will be present. A very large number of delegates has been appointed. The mining interests of the West will be adequately represented.

Hydraulic Mining.*

A REVIEW OF THE INDUSTRY BY DR. HENRY OEGROOT.

In Eight Parts—Part III.

Flumes and Trestles.—While, for the reasons stated, the flume should, as a rule, be avoided, conditions are sometimes such as to render recourse to the structures expedient, and that independent of topographical reasons, as for instance, where there is much rock to be excavated; where the ground is broken and porous, or water is so scarce that evaporation and absorption should be reduced to a minimum. Where a large amount of lumber is required for flume building, including supporting trestles, it may be economical for the company to manufacture this material instead of buying it, to which end a cheap sawmill should be put up at or near the head of the ditch, and, as the latter is finished and filled with water, float the lumber down to points where wanted. Almost always there is in California, at the head of these ditches, and generally for a long way farther down, timber suitable for making good lumber. A sawmill erected, lumber could be made not only for the flumes and trestles, but for all other purposes connected with the mining, the cutting of sluice boxes included.

In general terms, it may be said that as much grade should be given the flume as practicable, since the greater the fall the smaller the structure required to carry a certain amount of water. The material used in the construction of a flume must be proportioned to the size and duty required of it, much being left to be determined by the judgment of

When, as often happens in excessively cold weather, there is danger of the water flow in the flume or ditch becoming obstructed by the formation of anchor ice—that is, ice forming on the bottom—the water should at once be turned out or the ice may accumulate to such an extent as to fill the channel solidly and so remain till thawed out by the return of warm weather.

When in building a flume a curve becomes necessary, the outer side of the structure must be raised to an extent corresponding with the abruptness of the deflection. This arrangement, by throwing the accumulated water to the opposite side, tends to equalize the flow over all parts of the flume. When this occurs, the boxes or sections of the flume, usually 12 feet long, have to be shortened, the posts, sills and caps at the same time being set closer together. For the more readily effecting this curve, the side planks are on their inner face cut with a saw, the bending of the plank closing these cuts tightly.

For the construction of a box or 12-foot section of a flume $2\frac{1}{2}$ feet square, 261 feet of lumber, board measure, are required, being at the rate of 106,100 feet per mile. For a flume four feet wide, three feet deep and one mile long 241,560 feet of lumber are required, while for one of these structures seven feet wide and four feet deep of equal length 303,160 feet of lumber would be called for.

Iron Pipes.—Among the obstacles encountered in the conveyance of water to points where required for consumption or use are elevations above and again depressions below the common ditch level. For surmounting the former, recourse to iron pipes may be had if sufficient head to force

pressure, the pressure exerted having ranged from 74 to 384 pounds per square inch.

Where leakages occur in the slip joints of iron pipes, these, if but slight, can be stopped by throwing in a few bags of sawdust, or, if somewhat large, by driving in soft, well-seasoned wedges of pine which, swelling, make a very close joint. If the leak be extensive, recourse must be had to iron grip-bands, clamped on and drawn together with screws or wedges.

The Bracketed Flume.—When running a ditch-line for the Miocene company operating in Butte county, the surveyors encountered a depression at the foot of a perpendicular wall of basaltic rock, 450 feet high. To carry the water over the depression required for the support of the flume a long trestle-work, 186 feet in height. Appalled at the cost of building and maintaining a structure of this kind, the company's engineer, W. H. Bellows, conceived the plan of suspending the flume on strong iron brackets inserted into the face of the cliff, at a height of 118 feet above its base, which plan, having been approved by the company, was afterward carried out. The cut herewith shows the manner in which this flume is built and hung to the side of the precipice for a distance of 486 feet. The brackets are made from 30-pound "T" rails, bent in the shape of an "L." One of the larger arms of this "L," ten feet in length, is inserted in a hole drilled in the face of the rock, whence it extends horizontally, supporting the bed of the flume. The shorter arm, two feet long, standing at a right angle with the other, has its upper end shaped into an "eye," into which a strong iron rod is hooked, its upper end being fastened in the rock above.

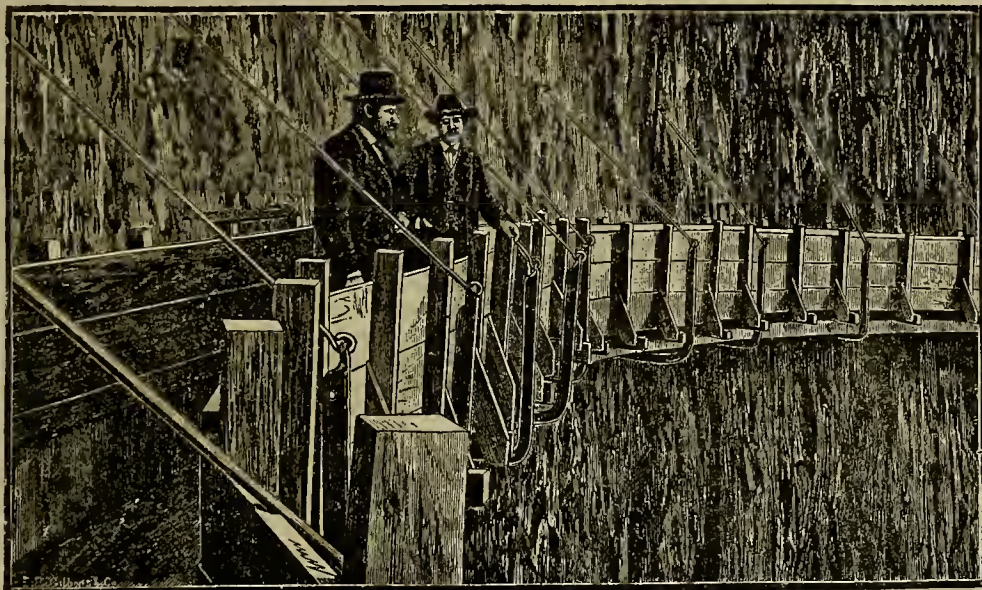
These brackets are set eight feet apart and were tested to support a weight of $14\frac{1}{2}$ tons each. The flume resting upon them is four feet wide and three feet deep, having a carrying capacity of 3000 miners' inches.

The trestle shown in the plate is 86 feet high. At another point on the line of this ditch is a similar structure 1080 feet long and 80 feet high, with still another 136 feet high.

Digging Gold on the Snake River.

Many stories are told about the wealth of gold sprinkled throughout the Snake river country in Idaho. As a general thing the gold is very fine, the particles being of so light weight as to be elusive. Save when worked on a large scale it is difficult to make good wages in recovering the gold. Numerous bars along the river would prove profitable could water be commanded for sluicing or hydraulicking. An adequate supply is hard to obtain, from the slight and gradual fall of the stream and the level character of the outlying lands. To overcome this lack of water, as well as to insure sufficient dumping ground, a big floating gold-saving dredge has been constructed and is now at work on the Idaho bank of the river about ten miles above the Payette. It is a stern-wheel flatboat propelled by steam. Substantially constructed, 65 feet long and 32 feet wide, it is equipped with a 35-horse power marine engine and boiler and adapted in every way for navigating Idaho's great waterway. With a slight alteration it could be transformed into a steam dredge and used to scoop up sand and gravel from the bottom of the stream. That has never been attempted. As in the past, operations are now confined to working bars out of the channel of the river.

As described in the *Helena Independent*, the method pursued is to anchor alongside one of these gravel deposits, and, by the use of scrapers, bring the material to be handled within reach of the gold-washing machinery with which the craft is rigged. The gravel is scooped up by buckets attached to an endless chain. There are 48 of these receptacles on a belt 60 feet in length, and each has a capacity of about 20 pounds of dirt, which is delivered into a hopper. This is also an agitator, and the process employed may be described as a steam rocker, with the exception that it has an end motion instead of one sidewise. The gold is caught on copper plates with quicksilver. The tailings are carried off in sluice boxes by a stream of water of 150 inches, supplied by a China pump, run by the engine which drives all the other machinery. The gravel is worked so thoroughly that no gold escapes in the tailings that are dumped into the river. An average of 100 tons of gravel are handled, and for this work three men are employed—an engineer, one to work the scraper, and another who shovels the dirt into a pile so that the buckets can scoop up a full load. The bar now being worked covers an area of 10 to 15 acres. The gold is on top or close to the surface, and will not pay to handle at a greater depth than one foot or eighteen inches. This shows a value of $1\frac{1}{2}$ to 3 cents a pan. A clean-up is made every night, and the average of the runs for the first three days was very satisfactory to Thornton Williams, the owner of the craft. He says he expects to take out upward of \$100 a day as long as he works.



Bracket Flume, Miocene Company.

the builder. Usually posts, sills and caps, made from 3x4-inch scantling with 4x6-inch stringers, will suffice for a flume $2\frac{1}{2}$ feet square—timbers, larger or smaller, being employed in proportion to the dimensions of the flume, the posts, sills and caps being set $2\frac{1}{2}$ to 3 feet apart. For lining, well-seasoned, first-class 1 $\frac{1}{2}$ -inch boards should be used, the seams being covered with pine battens $\frac{3}{4}$ inches wide and $\frac{1}{2}$ inch thick. An open space of a few inches is usually left between the upper edge of the planking and the cap. The posts should be let into the ends of the sills and caps to the depth of an inch and a half, but not mortised or tenoned. If thought necessary to strengthen the flume, the sill may be extended a foot or two beyond the post and side braces be nailed thereto. On the cap pieces a plank is placed to facilitate foot travel along the flume.

Where the latter rests on a trestle or scaffolding, the supporting posts and sleepers of these structures should be well charred to prevent their decay. High trestles ought to be anchored with strong wires or wire rope as a protection against the force of the wind. It is well to keep always some water flowing through the flume, as the swelling of the planks incidental to the change from a moist to a dry condition tends to induce leakage and draws the nails. As with ditches, waste gates ought to be placed at suitable intervals along the flume, that it may readily be emptied should occasion require. Where exposed to snow-sildes, it is customary to make an open cut in the mountainside, and, having placed the flume in the excavation, cover it with a shed composed of heavy timbers roofed over with planks or logging.

*This article was prepared by the late Dr. De Groot for the Eleventh Report of the State Mineralogist, just issued; but its publication with that of much other valuable matter was prevented by the necessity of revision and omission, so that the volume might be reduced to reasonable limits. It covers familiar ground, but is, on the whole, a complete and careful review of the industry and hydraulic-mining methods. The article has been furnished this paper by State Mineralogist J. J. Crawford.

the water over the obstruction can be obtained without going up the ditch too far, thereby necessitating the employment of an objectionable length of pipe. So, too, the elevation may be pierced with a tunnel if here again the cost of the adit is not so great as to make its construction impracticable. There being no other alternative, resort to one or the other of these expedients must be had, if either be feasible—a point to be determined by the preliminary survey—or else the projected enterprise must be abandoned.

Where the trouble to be overcome consists of a depression of the surface so deep as to preclude recourse to fluming, then the iron pipe in the form of an inverted siphon must be employed, where the conditions make this practicable.

The most remarkable feat of this kind extant or on record was that achieved by the Spring Valley Canal Company, who, for the purpose of conveying 1500 inches of water carried by their ditch across a deep canyon in Butte county, laid down a 30-inch iron pipe extending from one side of the gorge to the other, a distance of 14,000 feet, the point where the water enters this pipe being 980 feet above the bottom of the canyon and 150 feet above the point where it makes its escape. The water here entering the pipe, therefore, had a "head" or hydraulic pressure of 150 feet, yet at this end of the pipe it never attained a height of more than 50 feet above the point of discharge, at the opposite end, a fact denoting that a much smaller pipe than that laid down by this company would have sufficed for the above service. This pipe, which under the pressure mentioned discharged 53 cubic feet of water per second, was made of ordinary English iron, and, although it has now been in use over 18 years, it is still in good condition.

In its construction No. 14 iron was used for 150 feet pressure; No. 12 for 275 feet pressure; No. 10 for 350 feet pressure; No. 7 for 475 feet pressure; $\frac{1}{2}$ iron for 600 feet pressure; 5-16 for 850 feet pressure, and $\frac{3}{4}$ for 900 feet

The Red Point Drift Gravel Mine.

Abstract from Paper Read Before Technical Society of the Pacific Coast by Chas. F. Hoffman, M. E. Printed by Permission of the Society.

Before the Technical Society of the Pacific Coast, Friday, January 5, 1894, a valuable paper on the "Red Point Drift Gravel Mine," by Charles F. Hoffman, M. E., was read by Ross E. Browne, M. E. The mine was opened and worked under the direction of Mr. Hoffman, and he therefore had exceptional facilities for securing accurate and desirable information as to the cost and method of development. These he presented in very complete form to the society. The Red Point is a fine example of the systematic and economically worked drift mine, and a synopsis of Mr. Hoffman's paper, which follows, will be instructive to all interested in this branch of mining.

The Red Point is a drift mine in one of the ancient lava-capped channels of the Forest Hill divide, Placer county California. The elevation is about 3875 above sea level. It belongs to the Golden River Mining Company, of Paris. The channel is blue gravel and consists of boulders principally of metamorphic chists and porphyries, with a small percentage of quartz, intermixed with small pebbles and sand, and occasionally fine particles of iron pyrites. The gravel is "free," and is washed without crushing. Blasting, however, is required to facilitate extraction. The depth of gravel is from a few inches to 16 feet—generally seven or eight feet at the center of the channel. It is immediately capped with volcanic cement, which forms a good roof to work to. The overlying cement has a depth of 500 to 1000 feet. The washed and rounded boulders are often two or three feet, and occasionally six or eight feet, in diameter. The gravel often has a glistening appearance and is found to be coated with infinite quartz crystals. Here the gravel is barren. The gold is mostly in the form of "scale gold." In places there are streaks of coarser gold, and occasional nuggets of one or two ounces in weight.

The yield of gold may be divided into the following percentages: Coarse, 15.68; medium, 48; fine, 36; powder, 0.32. The gold varies in fineness from .928 to .937, valued at \$18.90 net per ounce. Most of the gold is found near bedrock. In some sections, however, it is mainly in the gravel above. The richest spot in the mine was found in a layer of gravel from 6 to 12 inches above bedrock. At this point the bedrock was hard and smooth and the channel straight. Some of the gravel was scraped up by hand, and contained as much as 33 ounces to the pan. For two months the average yield was \$7.50 per carload of 22 cubic feet. There is one rule which applies to this channel and perhaps to others with beds of stratified rocks. The consecutive strata having different degrees of hardness will form riffles, so to speak, along or across the channel according to its course. When the gold-dust strikes these riffles it is washed along them in the direction deflecting least from the course of the stream, and concentrates toward the rim. If it strikes at right angles, it lodges in the center or scatters to right and left. This rule holds good for the main bodies of pay gravel. Of course, if the bedrock is once covered, it no longer governs the travel of the gold in this way, and this rule applies only to the pay streaks on the bedrock. In these main bodies the quantity of gold varies much locally. It is generally more abundant in cracks, formed by the cleavage of the rock, at right angles with the strike; also around quartz veins, which are rough on the surface and hold the gold more readily, or where the slate is soft and thinly foliated. The lowest rut in the channel contains very little gold—sometimes some coarse gold—but the bulk is thrown on the sides or higher rock. It is also more plentiful on the down-stream side of islands and very large rocks.

The tunnel was driven through slate bedrock in the blue channel, being tapped by means of an upraise 1840 feet in the tunnel. It is 7x8 in the clear, has a grade three inches in 100 feet, and when originally run, had a double track for the first 100 feet, with a drain ditch in the center, and, from there on, a single track, with drain ditch in one side and switches every 500 feet. The switches and double track have since been removed. The rails are 16-pound steel, with gauge of track of 20 inches. The air compressor, located 200 feet vertically above and about 300 feet from the mouth of the tunnel, conveys air through a three-inch pipe. A wagon road, 6500 feet in length, was necessary to be built to the compressor site; also, it was necessary to bring water 2800 feet in a two-inch pipe to supply the works.

Work on the tunnel proper was begun July 2, 1886; six men ran 108 feet by hand; the compressor was started August 5th, and had reached a length of 1552 feet by January 31, 1887. The last 1444 feet were run with an average of 20½ men per day. Delays and accidents made the time of work on the 1552 feet exactly 6½ months, or an average of 234.1 feet per month, including hand work. For two

consecutive weeks the largest runs were 71 and 84 feet, respectively (six days each), or 11.82 and 12 feet per day, respectively. The tunnel runs diagonally across the strike of the rocks, which consist of strata of metamorphic slate, alternating with sheets of diabase diorite and barren white quartz. The regular force consisted of 15 miners (8 hours), 2 engineers, 2 drivers (12 hours), 2 blacksmiths, and 1 timberman (10 hours). The two latter worked only in the daytime. The cost of surface improvements was as follows:

Road.....	\$ 963.00
Yards, dump and trails.....	508.05
Boarding-house, office and other buildings.....	2,310.10
Water works.....	604.94
Air compressor, tank, pump, drills, etc.....	7,819.86
Air compressor (labor).....	970.00
Eight iron cars.....	1,200.00
Two tunnel horses, team horses, etc.....	705.00

Total cost of plant.....\$15,080.95

ACTUAL COST OF TUNNEL.

	Total Cost.	Per Running Foot.
Labor.....	\$11,418.47	\$7.36
Powder.....	2,641.47	1.70
Fuse.....	263.07	.17
Wood.....	1,105.50	.71
Charcoal.....	320.80	.21
Candles.....	290.40	.19
Footplank and Ties.....	147.10	.09
Timbers.....	46.76	.03
Steel Rails.....	510.00	.33
Horse Feed.....	281.25	.18
Materials, steel, oil, etc.....	693.00	.45
Freights.....	1,000.00	.64
Totals.....	\$19,239.85	\$12.40

With present reduced prices for powder, etc., such tunnel would now be run for \$11.25 or less per running foot.

From the upraise in the tunnel (at 1840 feet) the channel was worked both up and down stream. A branch tunnel was run up stream for 1300 feet, and two upraises made to the gravel. The second upraise is 3040 feet from the mouth. At this point a slope was raised into the channel with a grade one foot in two and one-half, and work on the extension of lower tunnel abandoned.

The system of workings is by a main gangway in the lowest part of the channel, with diagonal crosscuts every 100 feet. No logging is needed in timbering. Only posts and caps are required. Natural pillars of gravel are occasionally left. About one-third of the gravel, being of boulders over five feet, is not removed.

Two Baker blowers (4 and 4½) are used for ventilation. One is run by steam, the other (just installed) by water for one-half the year.

Four horses are needed for transportation of the gravel. The cars have 22 cubic feet capacity. The gangway trams are six cars; the tunnel trams are ten cars. There is a self-dumping charr at the dump. The total distance from the breasts to the dump is 6514 feet, or nearly one and one-quarter miles, 3273 feet being in the gangway and 3241 feet along the tunnel. The number of cars raised is 30.

The average number of men employed daily is 58.5 (22 white, 38.5 Chinese); average cost of labor per man, \$2.23; average number of carloads extracted per day's labor, 1.87. This estimate includes all hands. A man breasting gravel will average 2.80 to 3 carloads a day, sometimes more; the maximum by the whole force is 220 carloads.

The pay roll for six months, omitting labor for ventilation and transportation, shows an average of \$3169.75 per month. This gives for 3064 carloads a labor expense of \$1.03 per carload.

The cost of materials used for one month is, on an average:

1101 pounds powder, No. 2, at 10 cents.....	\$110.10
4800 feet fuse at \$5 per M.....	24.00
1766 caps at \$5 per M.....	8.83
615 pounds candles at 10½ cents.....	64.57
11 gallons coal oil at 26 cents.....	2.86
5 gallons engine oil at 65 cents.....	3.25
1½ gallons cylinder oil at 90 cents.....	1.35
6 gallons lard oil at 90 cents.....	5.40
11 gallons car oil at 35 cents.....	3.85
131 bushels charcoal at 20 cents.....	26.20
3662 pounds hay at \$25 per ton.....	45.77
1669 pounds barley at \$1.80 per cental.....	30.04
33 cords wood at \$2.87.....	94.71
Timbers, lumber, hardware, air pipe, rails, car wheels and sundries.....	236.00

Total average one month.....\$670.73

Total expense per carload is:

Ventilation.....	\$0.11
Transportation.....	.16
Labor.....	1.03
Materials.....	14½
Management.....	19½

Total per carload.....\$1.64

Total production during five years from January 1, 1888, to December 31, 1892, was 140,345 carloads averaging \$308,245.40, or \$2.20 per carload. The total production of the mine has been \$363,473.60 from 5073 running feet of channel, or \$71.65 per running foot.

The following percentages of the total yield are obtained from the different sluices (average of 12 months):

	Percentage.
Upper sluice (without quicksilver).....	82.48
Lower sluice (with quicksilver).....	3.89
Canon sluice (36 feet quicksilver).....	2.86
Canon sluice (182 feet quicksilver).....	3.24
Tailings.....	5.72
Panning tub.....	1.63
Blowings (back sand).....	.18
Total.....	100.00

Concerning Coal Mining Machinery.

In statistics recently issued by the Illinois Bureau of Labor there are some figures that are specially important just now. The *Engineer* has been reviewing these, and says that in some of the coal seams in that State the use of machines has been found profitable, and the number of the mines in which these machines are at work is increasing. Last year, according to the official statement, there were 41 mines in which machines were at work—the number of the machines thus employed being 300, and the amount of the men employed in connection therewith being 3646, or over 10 per cent of the total for the State. The machine mostly used is the Harrison machine, but the Ingersoll, the Yock, and others are employed, and all are operated by compressed air, except the Sperry machine, of which three are used, with the electric current. On the average 12 men are employed to each machine, and the product in the mines where machines have been used exclusively is about 13,758 tons for each machine in a year of about 229 days of active operations. The wages of the men vary considerably. Those who operate the machines average from \$2.25 to \$2.50 per day. The blasters receive from \$2 to \$2.25 per day; the timbermen about \$2; the helpers and loaders from \$1.75 to \$2 per day; and the laborers from \$1.50 to \$1.75 per day. Some facts are also given relative to the yield in the mines of coal for the powder used in blasting. In the machine-worked mines the average was 97 tons for each keg of powder; but the average in the hand-wrought mines is put as about 39 tons per keg only. The qualification is, however, necessary, that it is mainly in the mines where the seams of coal are thick that the machines are successfully used, and hence the powder necessarily dislodges a larger amount of coal per given quantity than it does in the thinner seams where hand-working is general.

In two of the five mining districts of the State of Illinois, the inspectors of mines report that electric coal-cutting machines are being put down or experimented with; and as the production in mines where machines are used is slightly increased in its proportion to that of the whole of the mines, it must be expected that there will be in the future a larger yield of coal by the machines. Thus, the area of the use of both hand and machine work is being defined by experience; and in the same way it is to be expected that the relative value of the different kinds of machines will in time be fully determined. These figures have an interest and value that is very great at the present time when the question of the cost and methods of extracting coal has become one that is most important in its hearings in all the coal fields, and in its effect on other industries. The use of electrical coal cutters as well as other kinds of motors for the purpose is being now tried in some mines on a scale that is at least important in furnishing the experience that is essential to enable a decision to be formed as to their relative economy in our mines, and thus it is probable that as labor is made more costly there will be a fuller employment of machinery.

Tin Mining on the Malay Peninsula.

The Kong Loon Kongsu mine, on the Malay peninsula, may be taken as typical of that district, says the *Manufacturers' Gazette*. An examination of the mine itself reveals the proportions of productive and waste matter to be: Strippings, 3.5 meters; pay gravel, 2.8 meters, or, in other words, a respective percentage of 55.6 and 44.4. Forty-one cubic meters are required of pay gravel for one ton of black tin ore, which means that 92.48 cubic meters must be mined per ton of ore, of which about 66 per cent is the white metal. The cost per cubic meter of gravel, Mexican money, is \$1.18. Sixteen kilograms of gravel (the weight of a basketful) raised 6.3 inches with a velocity of 5 centimeters per second, is regarded as the average work accomplished throughout a day of 6.5 hours, or actually 18,720 kilogrammeters per day. At Kotta Ranah the average workman seems to raise but 11.6 kilograms (25.59 pounds) a distance of 1.72 meters with an average velocity of 3 centimeters per second, or 9605 kilogrammeters per day of 7.66 hours. Perak is cited as more proficient in value of workmen, but even here the work done only equals about one-third that accomplished by white labor in temperate climates. The Eastern mines are usually worked by Chinese, either imported direct by the operating company or obtained through one of the various agencies established for that purpose.

The tools of the Chinese miner are primitive, consisting of a crowbar for breaking the harder rock, a chankol, or hoe, for handling the looser material, and with which it is put into the rattan basket in which it is carried out of the mine. A notched stick is used for a ladder. In shallow mines the baskets of ore are carried out on the back, but the old-fashioned well-sweep is brought into play in the deeper pits; also for handling the water. In the Malay peninsula steam pumps have been introduced.

The Prospects of Gold.

Mr. T. A. Rickard of Denver, contributes to the *Engineering Magazine* an interesting article on the prospects of gold production.

The highest yield on record for the whole world was in 1853, when it had a value of \$155,000,000. In 1890 only \$120,000,000 was reported. Since then there has been a fresh increase, but the output for 1892 was quoted by the director of the United States Mint as only \$130,816,227. To this might perhaps be added from \$5,000,000 to \$7,000,000 for China, whose production is omitted from the figures for the last two or three years. The distribution of the principal yield last year was as follows: Australasia, \$33,870,800; United States, \$33,000,000; Russia, \$25,801,645; South Africa, \$22,069,578; other countries, \$18,330,249. In the United States, in 1892, the leading contributors to the stock were the following States: California, \$12,000,000; Colorado, \$5,300,000; South Dakota, \$3,700,000; Montana, \$2,891,386; and Idaho, \$1,721,364.

Inasmuch as the United States, the colony of Victoria, Russia and South Africa, are now the principal producers, the outlook in those countries is next discussed by Mr. Rickard. In California he attributes the decline from \$81,294,700 in 1851 to only \$12,000,000 last year to legislation forbidding hydraulic mining and to the exhaustion of the auriferous deposits in the alluvium. No recognition is given in the article to question to recent attempts to resume placer mining in old river beds and the partial removal of restrictions on hydraulic mining; but these, if the gravel is already pretty well cleaned out, leave little encouragement.

Mr. Rickard thinks that quartz mining, which does not yield so handsomely as the earlier methods did for a time, is now our only resource. Indeed, he deprecates the romantic ideas derived from Bret Harte's stories, and insists that the miner of to-day wins success, or in any other industry, only by energy, judgment, science and common sense. "Gold is rarely got by digging at grass-roots," he says. So, too, in Victoria, the falling off from \$63,000,000 in 1853 to \$13,481,793 was explained by an official commission, after an investigation, to the thoroughness with which the alluvium had been worked, and to the difficulties and expense of vein mining. Although the largest amount of gold credited to Russia was secured several years ago (in 1880, \$28,759,860), Mr. Rickard regards the industry there still in its early stages. It deals mainly with the gravel at present. But too much obscurity involves the subject to make it safe to prophesy concerning that quarter of the globe. In the Transvaal there has been a rapid development in gold production from 1887, when the output amounted to \$755,212, to 1892, when it was valued at \$21,190,085; but the so-called "reefs" from which the precious metal is obtained are more like quartz lodes than alluvium, in Mr. Rickard's opinion; and he evinces scepticism regarding the alleged uniform richness and inexhaustibility of these deposits, reminding the reader that no California pioneer of 1849 expected the treasure so profusely strewn about him to give out, any more than the sanguine South African miners now look for a similar experience.

The existence of gold in considerable quantities in other lands where it has not been touched is granted by the writer here quoted, but he says that in most of those cases its location is amid unfavorable conditions. "To predict a near exhaustion of the gold deposits of the globe," he remarks in conclusion, "would be foolish; but it is certainly true that the difficulty of getting gold is daily increasing."

The last statement is of course to be taken in its broad sense as applied to the world generally. The difficulties increase as the surface deposits are exhausted, and gravel beds give out; but in California the change of conditions is gradually for the better. The industry was at its lowest ebb when hydraulic mining was stopped; but, as geological and mineralogical knowledge has increased, and mining methods and machinery been improved, confidence has returned, and the obstacles are not what they once were.

Cyanide in South Australia.

The *Glasgow Herald*, Thursday, Dec. 7, 1893, has the following: The government of South Australia recently appointed the Inspector of Mines (J. V. Parkes) to proceed to what is described as the Hills district (Blumberg and Mount Pleasant) and ascertain if the district offered sufficient inducement for it to erect a battery for the treatment of refractory ores by the MacArthur-Forrest cyanide process. Mr. Parkes met with 150 land-owners, miners and others and explained the position of matters. He said he had been drawn towards that place because of his knowledge of the many reefs which he considered payable, and which he knew were rich, and because of the stone that he had tested. It was a pity that the gold should remain in the earth when they knew that there were means of extracting it. The chlorination process was very good with respect to certain ores. Having proved that chemical re-

duction by chlorination or cyanide of potassium would yield high results, he had given up the idea that refractory ores could be treated profitably by amalgamation. On his return from the northern territory he called in at Ravenswood, where observed the MacArthur-Forrest cyanide of potassium treatment, which was very simple. The ore was put into the vats with the cyanide solution. He saw them agitating the ore for about four hours, and the result was that 93 per cent of the gold was taken out with no more trouble in cleaning up than with an ordinary battery. Parliament had resolved to erect a plant on a suitable site being fixed upon.

The *Register* (of Adelaide) had the following on Nov. 1: Ministers' eyes glistened on Monday morning—or at any rate it may fairly be inferred that they did—for beside the dusty, musty dockets they were enabled to gaze on glittering gold. It consisted of 54½ ounces obtained by the cyanide process at the Virginia mine, the first cake of the precious metal obtained at Wadnamanga by chemical reduction, which, it is hoped, will make a new and prosperous era in gold mining here.

The Arizona Big Bug District.

Prescott, Ariz., Cor. of *Denver Mining Record*.

A great many Colorado people are coming to Arizona just at the present time. Some are old-time prospectors, some are mine owners looking for new localities in which to invest, while others come because of the milder climate during the winter months. It is unfortunate for this great mineral section of the world that the laws of this territory are not more specific, or, in other words, a little more binding. A few men have taken possession of hundreds of claims, and after once locating all they have to do is, on January 1 of each year, to relocate by simply changing stakes and recording relocation; and so a Colorado prospector, used to locating, surveying, recording, and doing a \$100 worth of assessment work, runs up against unpleasant obstacles in coming here to prospect. Such is the situation, but it will be remedied in time. An attempt was made at the last session of the Territorial Legislature to adopt a greater portion of the Colorado mining laws; but the opposition was too great. The mine investor also, in coming here, finds in this a stumbling block.

In the Big Bug mining district are two kinds of deposits. One is that of iron, and the other of onyx. Of the former there is a vein 17 feet in width which averages 70 per cent hematite iron liberally charged with lime. In four tests made there showed less than 10 per cent silica and over 20 per cent lime. The mine has been extensively prospected along the surface and has a shaft 100 feet in depth. It is owned by Joe Mayer, of Big Bug, who has contracted with the copper smelter, just below the property, to furnish a given quantity daily, he receiving \$3 per ton for it on the dump. He considers the net profit of it to be \$2 per ton.

Of the onyx deposits much might be written, for there are acres of it not 100 yards from the Black Canyon stage road where it passes Mayer's station. While the quantity of it is great, the quality, so far as the quarry has been opened, gives evidence of being first class. Dr. F. Wm. Ihne, of Chicago, well known in Colorado as examiner of properties, has made a critical expert examination of the beds at this point, and he pronounces them the greatest ever yet discovered.

So far there has been located about 400 acres, one body of about 220 acres being owned by Joe Mayer and others, of Prescott, who have bonded the same to New York parties for the sum of \$200,000. A number of payments have been made, and it is only a question of time when this company will have erected at this point works for the purpose of reducing the blocks to proper size for shipment. Mayer's station, where the quarries are, is 78 miles from Phoenix and 28 from Prescott.

There is another bed of black and white onyx situated about 12 miles east of south of those at Big Bug, which are owned by Sheriff J. R. Lowery and Charles Bishop of Prescott. So far as opened up the stone appears good and is pronounced by experts to be a very fine onyx. The owners have the same bonded to St Louis and San Francisco parties.

Six miles south of Camp Verde, on the Rio Verde river, and 35 miles due east from Prescott, is a large quarry of lithographic stone. The same was located a year ago last July, but has never been extensively opened, though prospected so as to show a 50-foot face, and back into the mountain about 15 feet. West of that opening are two others of something like a six-foot face 100 feet in length. Until lately it has been believed that these deposits of carbonate of lime carried too much iron to admit of its use for lithographic purposes; but all this has been dispelled by tests made in Los Angeles, Chicago, Cincinnati and Washington. Prof. Blandy, ex-territorial geologist, has lately made a thorough examination of this quarry and says he found two beds of three to four feet in thickness, and is of

the opinion that as depth is gained the quality will improve. The stone appears to be uniform in grain and texture. Several openings have been made showing from a 60 to 100-foot face, and no difference in quality appears to exist in either stratum. In the gulch 350 feet below flows a fine stream of water the year round, and of sufficient fall to give power to any size mill which may be erected to work upon this stone. This quarry is owned by George W. Line and others of Prescott, who expect to dispose of it to Los Angeles and New York parties.

Buying Mining Machinery.

A great many mistakes are made in the purchase of mining machinery, and the chief cause of these errors lies in the fact that the purchasing parties are too eager to get the machinery on the ground before they have demonstrated what they can count on for an output, or by the purchase of machinery which is not required on the property and will not do the work required of it, says the *Spokane Mining Review*. As a rule the fault lies with the purchaser.

The first thing to know is what the mine contains. Tests of the ore should be carefully made at various stages of the property's development, all of which should be carefully noted and recorded in a book for that purpose. Not only should the value of the ore and the different mineral contents be learned, but in every instance the owner should know in what form the mineral occurs. After this has been done and a sufficient amount of ore is taken out and exposed to justify the purchase of a mill or concentrator, unless the owner is well informed himself or has a practical man of experience with him, he could do no better than to go to a responsible mining machinery dealer and lay all the facts before him, when, in the majority of cases, he would get the proper machinery and be able to successfully operate his mine.

There are very few mining men who are competent millmen, for like dentistry which is practiced to a greater or less extent by physicians, and particularly where dentists are not available, there are few who are good dentists. Milling, concentrating, smelting and refining are each adjuncts of mining, and yet few miners are masters of even one of these adjuncts any more than a millman who has spent many years in that business is a first-class mining operator. But the salesman of mining machinery has a varied experience in his business. He is called upon to put mills and concentrators into all kinds of mines, and the safest way to do, unless you are yourself a practical millman, is to enlist his attention and avail yourself of his experience. In that manner you may turn a worthless enterprise into a profitable investment. But the first rule is to know that you need machinery and the property will justify or demands its erection.

Big Hydraulic Mining Enterprise.

Abridged from the *Plumas National Bulletin*.

James O'Brien, the mining man, will be up from San Francisco some time next week, and upon his arrival the Quincy Mining & Water Co. will begin constructing the stone dam across Spanish creek at the Devil's Elbow, and will vigorously prosecute the work till this important task is finished. A few days ago the men employed on the big ditch and other work were paid off. The permit to build the dam at the Elbow, at the time it was granted by the Debris Commission, was considered the most important action taken by that body. The dam site is one of the best that could be found—in a deep, narrow canyon, where, by making a cut across an elbow, the water can be discharged off at one side of it, over a solid rock bottom, thus rendering the dam perfectly secure when finished. Behind this structure will be an immense impounding reservoir, rendering it possible for the company, with smaller and less expensive dams to be built, to operate for years on the large beds of rich gravel which it owns.

The water privilege owned by this company is one of the largest and best in this part of the State. The ditch, whose capacity is 2000 miners' inches, is the outlet of a large reservoir near Spanish Peak, and which husbands the waters of the deep snows which meet there late in the spring. By raising the dam of the reservoir the water reserve has been largely increased, enabling the company to mine fully seven months annually. The corporation now owns 2200 acres of gravel, covered by its water system. This system virtually controls all the mines along the line of its ditches. The ground worked there in the palmy days of hydraulic mining yielded large returns. Indeed, the shipment of gold from Spanish Ranch has run up into millions. There is no reason to doubt that the remaining large gravel deposits to be mined by the Quincy Mining & Water Co. will yield large returns upon the investment. The past record of that section as a gold producer is convincing proof of this.

Colorado's Mineral Output.

Colorado's output of gold, silver, lead and copper for 1893 amounted to \$30,218,837.

Taking into consideration the low price that has obtained throughout the year for three of the metals, the total is remarkable, and it shows that, despite the hostile legislation against silver and the general depression which has affected the price of baser metals, the State continues to uphold the pre-eminent position which it gained years ago.

Had not the price of silver fallen to an unprecedented extent, the output of 1893 would have been very much greater, but as matters stand there is no ground for complaint.

There were 23,017,089 ounces of silver produced from Colorado ores during 1893, as compared with 26,542,135 ounces the previous year. The first half of the year the output was ahead of any other year, but when silver fell so rapidly about midsummer the industry was paralyzed for a short time.

The stimulus given to gold mining by the discovery of new camps of great richness and by the fall in silver is very apparent in the output for 1893, which exceeds last year's by nearly \$2,500,000.

The following table from the Denver Republican will show the product of the smelters, etc., for the year. As some of the works do not divide the Colorado ore from that treated from outside the State in their reports, the amount has to be approximated:

PRODUCTION FROM COLORADO ORES IN 1893.								
Source of Production.	Copper. Pounds.	Lead. Pounds.	Silver. Ounces.	Gold. Ounces.	Copper. Value.	Lead. Value.	Silver. Value.	Gold. Value.
Boston and Colorado smelter.....	1,521,490	.....	2,500,610	45,606	152,149	.....	1,953,813	942,662
Globe smelter.....	350,000	12,751,802	3,766,044	24,004	35,000	462,252	2,937,514	431,696
Omaha and Grant.....	962,346	15,258,445	7,591,425	82,404	96,234	551,412	5,845,398	1,703,301
Denver Branch Mint.....	.....	.....	9,838	69,266	.....	.....	7,664	1,481,462
Colorado smelter, Pueblo.....	.....	11,758,830	1,001,612	10,077	.....	428,487	771,248	208,291
Philadelphia smelter, Pueblo.....	700,138	19,289,313	1,828,948	27,808	70,018	338,272	1,504,679	574,781
Pueblo Smelting Company.....	380,000	15,000,000	1,688,640	27,997	38,000	543,040	1,315,679	578,898
American smelter, Leadville.....	.....	590,000	544,411	13,148	.....	403,139	422,285	252,960
Arkansas Valley smelter, Leadville.....	476,000	8,750,000	600,000	5,250	47,600	267,925	458,000	108,517
Butteville smelter, Leadville.....	467,981	219,378	593,790	1,150	46,798	7,930	462,218	23,770
Elgin smelter, Leadville.....	.....	2,421,395	112,321	2,432	.....	86,543	87,609	51,530
Harrison reduction works, Leadville.....	102,449	2,003,547	236,037	2,096	10,244	61,726	186,108	43,324
Holden smelter, Leadville.....	.....	3,150,000	508,760	7,860	.....	114,187	389,737	162,260
San Juan smelter, Durango.....	200,000	5,779,503	1,081,560	16,190	20,000	209,217	823,236	334,647
Standard smelter, Durango.....	2,528,858	.....	367,697	21,718	252,235	.....	285,725	448,911
Brace smelter, Rico.....	25,000	222,000	44,337	168	.....	805	35,050	3,410
American zinc-lead works, Canyon City.....	300,000	940,000	95,000	370	30,000	34,028	74,100	7,647
Holden smelter, Aspen.....	.....	.....	224,219	78	.....	.....	173,110	1,612
Eastern smelters.....	.....	200,000	53,740	1,112	.....	7,240	41,917	22,985
Retorts and bullion shipped direct.....	.....	.....	.....	17,000	.....	.....	.....	350,000
Totals.....	8,007,741	89,333,213	23,017,089	375,771	307,271	3,811,223	17,797,890	7,802,453

The marked superiority of the Colorado smelting works for the treatment of all kinds of ore is being manifested in the increasing amount of ores received from other States. During the last year the increase has been unusually large.

The Raber Amalgamator.

The official description in letters patent granted by New South Wales to Nathan Leroy Raber of Benton county, Oregon, for his improved amalgamator is as follows:

The invention seeks, among other improvements, to provide simple means whereby the sand, pulp, etc., are properly directed to the mercury; also means for keeping the mercury constantly sensitive, pure and active; and devices by which the adjustment of the main frame or box and the mercury cup may be independently effected, so that either the main frame or the mercury cups may be adjusted to different angles to the horizontal without necessitating a corresponding change in the other part. The inventor employs a main frame, which is in the nature of a shallow box having vertical sides and stepped bottom, such bottom consisting of a series of steps formed with what may be termed the risers and treads. These risers and treads and the sides are properly joined, usually by rabbetting, and are firmly nailed and clamped together. At its upper end the main frame or box is closed by a cross-board, while its lower end is open, so that the tailings, pulp, etc., may freely discharge. The sides are braced by the beams or bars extended between their upper edges and firmly se-

cured to both sides. These tie bars not only brace the sides of the main frame, but they also serve as supports for the holders of the mercury renewing materials. At its four corners the main frame is provided with adjusting screws or bolts turned through threaded bearings and against base supports or seats, which may be on sills. By this means the frame or box may be adjusted to any desired inclination, both longitudinally and laterally, and so be set to suit the quality or quantity of the material being treated. Upon each step is placed a plate of silver-plated copper, held at its upper edge and sides by cleats, and projecting at its lower edge beyond its supporting step, so that each plate overlaps at its lower edge the upper of the plate on the next lower step. Beneath the lower projecting edge of the plates are arranged the mercury cups or troughs, which rest upon the steps, or may be otherwise supported as desired. These cups are supported, so that they may be adjusted independently of the adjustments of the main frame, such independence of adjustment co-acting in permitting the angle of the main frame to be varied to regulate the speed with which the material may pass through the apparatus, and at the same time enabling the angle of the mercury cup to be retained or varied as may be desired. The troughs are carried upon suitable brackets or supports at each end, which are provided with adjusting screws bearing upon iron plates or carriers rested upon the steps, and these screws permit the adjustment of the cups.

An enterprise for the working of the Murray, Idaho, placer district on a large scale is being talked of, with reasonable prospects that it will go through this winter, says the Spokane Review. Syd Mills, who owns nearly 100 placer locations in the vicinity of Eagle creek, and who also controls several lakes in western Montana, in the Bitter Root mountains, from which it is designed to convey water 20 miles to the diggings, is one of the principal parties to the proposed scheme. John M. Burke, who is now in the East, has a bond on a large amount of old wash on Pritchard creek. The promoters see the possibility of uniting for the purpose of securing a large quantity of water. It will cost from \$100,000 to \$300,000 to develop the plan, which has been pronounced feasible by mining engineers.

ALL of the larger gold mining properties about Baker City have ceased operations for the winter because of the depth of snow on the mountains. A large number of men have in this way been thrown out of employment, but they are of a class that are fully prepared to take care of themselves and their families during the winter months.

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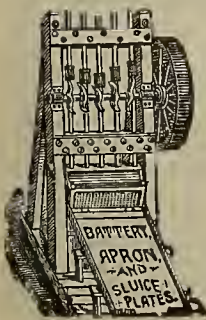
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The Harvest Moon.

The time of moonrise on any day is on the average about 51 minutes later than it was on the preceding day. This retardation is, however, by no means constant in amount, being at times very much less than the average and at times very much greater. A very marked diminution in the time of retardation occurs about the time of the full moon which falls in September, says the *Popular Science News*.

This moon is called the harvest moon. The same phenomenon in a less degree occurs at the time of the following full moon, which is known as the hunter's moon. The time of retardation during the harvest moon is less than half an hour in our latitudes, instead of its average value of nearly an hour, and for several successive nights the moon seems to rise at nearly the same time.

Briefly stated, the cause of the phenomena is this: At the time of the rising of the harvest moon the apparent path of the moon among the stars is much less inclined to the horizon than it is at other times, and the ordinary day's motion of the moon along this path makes an unusually small change of position of the moon with reference to its distance from the horizon.

A more detailed explanation may make the matter a little more easily understood. In addition to the ordinary apparent daily motion which the moon has in common with all other heavenly bodies, it has another motion by which it completes the circuit of the heavens relatively to the sun once a month, and the direction of this motion is generally not parallel with the direction of the diurnal motion, it being generally northward or southward as well as eastward.

Any one may see this motion by an hour's watching of the relative positions of the moon and a star near it. The diurnal motion is always on a line at right angles to a line drawn from the body of the celestial pole, the point in the heavens approximately indicated by the pole star. It is always perfectly uniform about the pole as a center, and it is this which we take as our ordinary measurement of time.

Now, consider the position of the moon and the sun at the time of full moon. The moon rises just as the sun sets. On the next evening the moon will still be below the horizon, because it has moved westward among the stars relatively to the sun, and it will not rise until the diurnal motion of the heavens brings it above the horizon. If the moon's motion were uniform and always along the line of ordinary diurnal motion, this retardation of the time of rising would always be the same, and would, as stated at the outset, be 51 minutes per day.

But at the time of harvest moon the direction of motion of the moon among the stars is considerably northward as well as eastward, and at the time of moonrise this line makes a comparatively small angle with the horizon, very much less than it does at other times of full moon during the year. Therefore, at sunset on the day after the full, the moon having moved along a line which is inclined to the horizon at a much smaller angle than usual, its distance below the horizon will be less than the average, and hence a smaller amount of diurnal motion will bring it into view—that is, the retardation of time of rising is less than it is at other times. This condition continues for several days.

Several other things, notably the inclination of the moon's orbit to that of the earth, and the varying rate of motion in the orbit due to variation of distance from the earth, tend to change the amount of daily retardation, but they do not depend upon the time of the year, and they sometimes intensify and sometimes diminish the peculiar phe-

nomena of the harvest moon. Latitude has a strong effect, and in Northern Europe the phenomenon is a much more noticeable one than it is the United States. In fact, if one goes far enough north, the harvest moon may rise even earlier on any night than it did on the night preceding.

Determination of Manganese in Manganese Bronze.

Mr. Jesse Jones, of the Chemical Laboratory of the well-known ship-building firm of Messrs. Cramp, in Philadelphia, has recently explained to the American Chemical Society the method in use in that laboratory for the determination of manganese in manganese bronze. It is an adaptation of a well-known method in common use for the determination of manganese in iron and steel. A determination can be made in less than one hour, and, as the amount of manganese in the ordinary run of work seldom exceeds 0.10 per cent, the method gives fairly satisfactory results. The following is the method: Dissolve 5 to 10 grammes of drilling in nitric acid of 1.20 sp. gr., using a large beaker to avoid frothing over. An excess of acid must be avoided, as it interferes with the precipitation of the copper by hydrogen sulphide. When solution is complete, transfer to a 500 cc. cylinder without filtering out the precipitated stannic oxide. Make up to 300 cc., and pass a rapid current of hydrogen sulphide from a Kipp's apparatus until the supernatant liquid is colorless. Decant off through a dry filter, 180 cc. corresponding to 3 or 6 grammes of sample, and boil down rapidly to about 10 cc. Transfer to a small beaker and add 25 cc. of strong nitric acid. Boil down one-half, make up with strong nitric acid, boil, and add one spoonful of potassium chlorate. Boil ten minutes and add another spoonful of potassium chlorate. Boil till free from chlorine, cool in water, and filter on asbestos, using filter pump. Wash with strong nitric acid through which a stream of air has been passed. When free from iron, wash with cold water until no acid remains. Place the felt and precipitate in the same beaker, and dissolve in ferrous sulphate, using 5 cc. at a time. Titrate back with permanganate until a pink color remains. Deduct the number of cc. used in titrating back from the number of equivalents of ferrous sulphate used, and the remainder shows the manganese in the amount of sample taken. Permanganate solution.—Dissolve 1.149 gramme potassium permanganate in 1000 cc. water; one cc. equals 0.001149 gm. manganese. Check by dissolving 0.1425 gramme ferrous-ammonium sulphate in a little water and acidulating with hydrochloric acid. This should precipitate 10 mgms. of manganese. If not, apply the factor of correction. Ferrous sulphate solution.—A solution of ferrous sulphate in 2 per cent sulphuric acid, so dilute that 5 cc. corresponds to 10 cc. permanganate solution. This is best made by trial and dilution.

Dust Over Buried Cities.

The rapid shifting by the winds of beds of sand, often destroying or menacing human works, is a phenomenon well known in different parts of the world. But the slow accumulation of the finer particles—the atmospheric dust—has attracted attention only in recent years. Most ruins of ancient cities are buried, and it has now been learned that the covering is not only the debris of decayed buildings and other works, but that much of it is atmospheric dust. The layer that becomes visible to-day on a polished surface, if undisturbed, may grow into a deep stratum in the course of centuries.

Gaseous Theory of the Earth.

The idea of M. Rateau, as expressed to the French Academy of Sciences, is that the phenomena of the earth's crust are well explained by considering that the planet's in-

terior is molten, and that a layer of gaseous matter separates it from the portion of the crust forming the continents, where the seabeds rest directly upon the igneous globe. The continental masses tend generally to rise, being forced up by the accumulating gases, while the seabeds sink. The gradual escape of the gases, imprisoned under high pressure, will in time exceed the production of new supplies, when the pressure will diminish and the continents fall in, giving rise to more or less crateriform configurations. This is the state in which the moon now appears. Assuming the crust to be 18½ miles thick, the pressure of the gases should be 650 atmospheres, their temperature 900° C., and their density nearly equal to that of water. This theory makes it clear why volcanoes in the interior of continents give off gas instead of lava, and why lines of coast volcanoes have successively receded inland where the sea has encroached.

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Mechanical Progress.

Cyanide Potassium and Iron and Steel.

The effects of cyanide potassium on iron and steel are interesting to a high degree. Machinists use two forms of this chemical—the ferro-cyanide, or yellow prussiate, and the fused white cyanide, with the iron removed, writes Albert D. Pentz in the *Engineering Magazine*. The effects of these two forms seem identical as far as the hardening of iron is concerned, and if they differ at all in effect, it is in the superior degree of strength possessed by the white cyanide. That a film of this substance melted upon the surface of a red-hot iron article can cause it to harden on the surface, which otherwise would remain soft after quenching, is a marvelous and a valuable fact. The question of how this is accomplished cannot be absolutely answered, but it can be conjectured to a probability. Cyanide potassium has a close affinity for sulphur—so great, indeed, that it will absorb that element from tarnished silver, for which metal, in turn, sulphur has so great a liking that its most attenuated vapors collect on spoons and other articles of plate from the atmosphere, forming a sulphuret in the form of a black coating on the surface. A great many of the smaller sizes of iron screw rods are coated with copper and some of them, at least, are merely treated in a solution of the sulphate of copper to produce this result. In this treatment, the sulphuric acid leaves the copper in the metallic condition on the rod and attacks the surface of the iron. Hence there always is a sulphate present under the copper coating thus produced on screw rods. In case-hardening articles made from coppered screw rods of the kind named, it is found that animal charcoal has not a sufficient effect on so much of the original surface as has had no cut taken to remove the influence of sulphur from it, but where there has been a considerable amount of that surface removed to a reasonable depth, and has thus exposed the iron beneath the influence of the sulphur, this charcoal prepares it to harden in a satisfactory manner. Now, it is found by experiment, where the surface of such a screw rod does not become hard after treatment with animal charcoal in the usual case-hardening process, that cyanide potassium will neutralize the sulphur and assist this kind of surface to become hard. This substance does not work very well when mixed with the animal charcoal in the hardening case, because it does not spread freely, but clings to the charcoal in a manner not clearly understood, and so closely that the metal under treatment receives but little, if any, of it. If the pieces be touched where needed by a piece of the cyanide as they are taken from the box to be quenched, it will serve. This is often not practicable, however, as in the case of a great quantity of small pieces which would cool too quickly for such treatment. In this case it is suggested that a quantity of cyanide be dissolved in water, making a strong solution, and articles be quenched in it.

To Pump Natural Gas from Indiana to Ohio.

It is announced that a company of capitalists, principally from Lima, with Dr. S. A. Baxter and Senator Calvin S. Brice as the leading spirits, has been formed for the purpose of conveying natural gas from the Indiana field to Lima and the different towns in that section of Ohio. The company, it is stated, has secured leases on over 10,000 acres of gas territory, located in Jay, Delaware, Blackford and Madison counties, and is still acquiring more, and expect to make the block 15,000 or 20,000 acres before it is through with this part of the scheme. Its object is to furnish gas to all the different companies who now have plants in operation, but are sadly in need of a supply. In the list is embraced the following cities

and towns: Dayton, Springfield, St. Mary's, Van Wert, Lima, Sidney, Piqua, Troy, Covington, Versailles, Bremen, Minster, Urbana, Celina, and two or three other places. By the leading lights of the big undertaking it is claimed that in these plants there is invested over \$5,000,000, and all are dependent for their supply of gas from the small area of territory in Auglaize and Mercer counties, the pressure of which has been reduced to a mere nothing, and is virtually exhausted.

As now mapped out, they will lay a 16-inch main from the field a distance of 35 miles, while the feeders from the wells will be 6 or 8-inch lines, and the aggregate will make 75 miles of pipe. In the consummation of this scheme it is estimated the cost will reach over \$750,000, and possibly \$1,000,000. They expect to begin work before long and diligently prosecute it until finished.

Experiments with Magnetic Concentration.

Dr. Wm. B. Phillips of the Tennessee Coal, Iron and Railroad Company described to the Alabama Industrial and Scientific Society at its recent meeting, the results of some experiments with magnetic concentration on samples of red fossil iron ore weighing from 1 pound to 3000 pounds. Conclusions as to the commercial aspect of the process cannot be based upon the results reached to the present time. Dr. Phillips in the last six months has made more than 100 analyses in connection with the subject, treating various ores on a scale of 3000 pounds in a Hoffman separator. The results justified the conviction that they could take an ore of 35 to 40 per cent iron and 30 to 40 per cent ferruginous sand, with which the real ore is mechanically mixed, and bring the iron up to 55 to 60 per cent, at the same time reducing the sand to 10 to 13 per cent. Acting upon the results reached the company decided to erect a magnetizing kiln for treating 125 tons per 24 hours. The foundations are laid, the designs for the crushing, sizing and concentrating plant have been made, and, if nothing interferes, it is expected to have the whole plant in operation by the middle of February or the first of March.

New Furnace Lining.

B. Richards of Swansea, Wales, is the inventor of an improved lining for blast, reverberatory and other furnaces used in smelting copper and other ores, says the *American Manufacturer*. It is intended to provide a means for preventing the metals penetrating the sides and walls, as is said to occur in the present construction of furnaces. In carrying the invention into effect, the inventor provides on the sides and walls a layer of asbestos, fixed in any suitable manner and of a thickness corresponding to the requirements of the furnace. The asbestos is sewn together with strings of osbestos to the shape of the furnace, and laid on the claw bottom and up to the sides of the furnace bridge and foreplates, and a layer of sand seven inches thick is placed on the asbestos and the sides to be clayed. By thus preventing the penetration of the metals into the walls, a great saving is said to be effected.

A Great Bridge.

A proposal is afoot for building an immense bridge over the Mersey, to connect Liverpool with Birkenhead. According to descriptions in the Liverpool newspapers, the bridge will be of the arched suspension type, in three spans, the roadway being suspended from an arch instead of the usual chain. Each span will have a clear waterway of 1100 feet, the center span having a clear headway of 150 feet above high water of ordinary spring tides. The designs of the structure have already been completed.

Useful Information.

Uses of Cotton Seed Oil.

Last year there were probably 1,250,000 tons of seed crushed. Out of this seed there were obtained 1,000,000 barrels of oil. Of this amount it is estimated by *Pharmaceutical Era* that 300,000 barrels are used in Chicago for making lard, and St. Louis, Kansas City and Omaha are credited with about 200,000 in making the same product. A comparison of the statistics of lard production and cotton seed oil consumption might show interesting results as to the composition of the former. About 20,000 barrels of cotton oil are used on the coast of Maine to pack sardines, and probably from 50,000 to 100,000 barrels are used by soap-makers in the manufacture of toilet soaps. About 250,000 barrels go to Rotterdam, Holland, for making butter, and large quantities go to southern Europe for mixture with the pure (?) olive oils exported from Marseilles, Trieste, and other Mediterranean ports. Although this oil is not to be preferred for illuminating purposes on account of its containing too much gum, considerable of the cheaper grades is used for such purposes. The use of this article upon its own merits is, however, rapidly increasing. It is already extensively used in Latin countries as a cooking grease, and several American manufacturers are advertising it for culinary purposes.

How Long Will Japanese Coal Last?

This is the title of an article in a Japanese contemporary which considers that Japanese coal will become exhausted in 25 years and 10 months. Taking the statistical returns of the yearly yield of coal in Japan from 1882 to 1891, 17,453,390 tons is obtained as the average annual yield. Estimating the average proportional annual increase at 13 per cent, it is calculated that in 1911 the yield will be no less than 303,347,350 tons. Proceeding in this way, the conclusion is arrived at that the total yield for 25 years to come, computed from the current year, will be 515,552,326 tons. As the latest figures given by the *Noshomusho* fix the capacity of the Japanese coal mines roughly at 759,720,000 tons, and the proportion available for practical purposes being, according to the experience of England, three-quarters of the total capacity, it follows that the actual amount of coal which the mines will yield for use is 369,790,000 tons. If from that amount be deducted the aggregate annual production in 25 years, reckoned from 1891, there remain only 54,237,674 tons. In other words, in January, 1916, there will remain to Japan a supply of coal only sufficient for ten months.

A New Annealing Furnace.

A. Beard, Cambridge, Ohio, is the inventor of an annealing furnace in which some radical departures from present methods of construction are introduced, says the *American Manufacturer*. It is designed especially for annealing light sheets of steel such as are used generally in tinned plate manufacture. The old practice of charging and drawing boxes through the doors at the side of the furnace is abandoned, the furnace being built vertically and charged in that manner. By a simple arrangement annealing boxes, together with their bottom plates and contents, are easily handled by two men. Manual labor and its consequent cost is very largely dispensed with. It is claimed that the furnace is economical in construction and maintenance. The design is adapted for using coal, natural gas, crude oil or fuel gas.

Improved Air Brake.

An improvement has been made upon their air brake by the Westinghouse people, by which greater pressure is exerted if the train be running at very high speed. In fact,

there is a valve which regulates the pressure to correspond with the speed of the wheels. As the velocity is reduced, the cylinder pressure is reduced. Some experiments were made not long ago with this improved brake on the Pennsylvania railroad, and the performance was highly satisfactory. A train was stopped in 971 feet from a speed of 60 miles an hour. The ordinary emergency brake required 1235 feet in which to stop the same train.

How to Catch Mice.

Take a jar or tin bucket and fill it about half full of water and place it where mice are in the habit of promenading. Take a board 18 or 20 inches long, one end of which lay on the floor or ground, as the case may be, and the other end on top of the bucket. Sprinkle a handful of oats over the water in the bucket. This will not sink, but will remain on top and hide the water from view. Now sprinkle wheat, corn or anything else that mice like on the board so as to entice them to the top, when they will see the oats in the bucket and jump in to get it and soon perish.

I have tried this plan with quite satisfactory results. The trap is always set, and, when a mouse once gets in, there is no getting out. Of course it should be noticed every day or two, and the drowned rodents removed. I have never tried to catch rats in this way, but think if a jar that would hold six gallons or more were used, the plan would prove quite satisfactory.

It is a much safer way than the use of "rough on rats" or other poisons, and is considerably cheaper than those notorious "champion liar" rat traps. Give the plan a trial.—Ohio Farmer.

How To Tell a Person's Age.

A German newspaper says the age of a person and the month in which he was born may be discovered as follows: First you ask him to go to the other end of the room, to prevent your seeing what he is going to write. Then you ask him to put down the number of the month in which he was born, and multiply the latter by two; add five to the sum and multiply the latter by 50; add his age to the product; then deduct 365 and add 115 to the remainder. Suppose he is 49 years of age and was born in February—the computation might stand thus: 2×2 equals 4, plus 5 equals 9, $\times 50$ equals 450, plus 49 equals 499, minus 365 equals 134, plus 115 equals 249. The last two figures indicate the age, viz., 49, and the first figure, 2, February, the second month of the year. You simply ask the person to state the result of the calculation, and then declare that he was born in February and is 49 years of age. Experiment with this as often as you please and it is sure to work, provided you do it correctly.

Hardening Plaster.

It is stated that French builders, who have carried the art of hardening plaster to where it is used for flooring, either in place of wood or tile, employ for this purpose six parts of good quality of plaster intimately mixed with one part of freshly slaked white lime finely sifted, says the *Tradesman*. The mixture as thus composed is laid down in as quick time as possible, care being taken that the trowel is not used upon the surface for too long a time; after this the floor is allowed to become very dry, and is subsequently saturated in a most thorough manner with sulphate of iron or zinc, the iron giving the strongest surface, its resistance to breaking being found to be 20 times the strength of ordinary plaster. It appears that with sulphate of zinc the floor remains white while when iron is used it becomes the color of rusted iron; but if linseed oil, boiled with litharge be applied to the surface, it becomes of an attractive mahogany color, this being especially the case if a coat of copal varnish is added.

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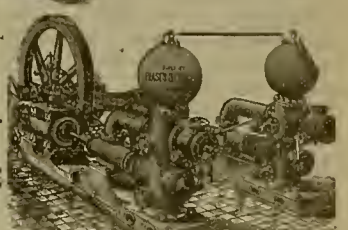
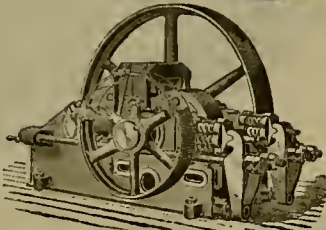
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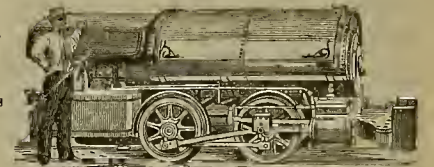
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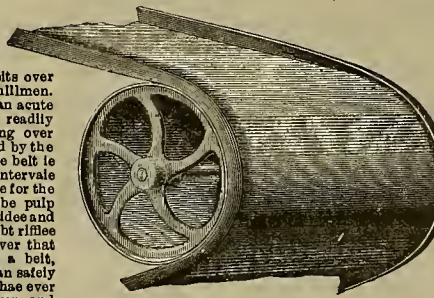
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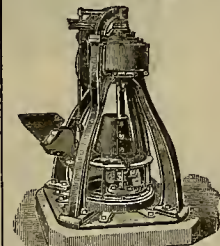
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Electricity.

A Chance for Inventors.

A prize of \$50,000 has been offered by the Metropolitan Traction Company of New York City for a system of street-car propulsion which will be superior or equal to the overhead trolley, without possessing the objectionable features of the trolley for crowded thoroughfares. The president of the company, John D. Crimmins, says that the general idea is to encourage some sort of underground trolley system.

The proposition was embodied in a letter sent to the State Board of Railroad Commissioners, and reads as follows:

"On streets where the lines are straight and the business is heavy the cable system is the most economical yet invented. For general use in a city, winding about through the streets following the routes of travel which the public wish to pursue, it is impracticable. You require straight routes for cable roads. We have, in addition to the lines upon which the cable will be laid, over 80 miles of street railroads now operated with horses, all below Central Park. It is to these lines in particular that we now desire to direct your attention.

"Up to the present time the only system whose practicability has been demonstrated is the overhead trolley. We are well aware, however, that its application in the streets of New York would not meet with the approval of the community. What we most desire now is to hasten the development and perfection of a better system. We therefore submit the following proposition:

"First—We will set aside the sum of \$50,000 to be awarded as a prize to any person who shall, before March 1, 1894, submit to your honorable board an actual working system of motive power for street railway cars demonstrated to be superior or equal to the overhead trolley.

"Second—The qualities necessary to meet this requirement shall be left to your decision; but with the present state of art, a system to win the award must necessarily approximate the trolley as a standard of economy in operation, but should be without the features objectionable to the public that are in it.

"Third—We shall exact no rights in the invention in return for the \$50,000, and shall have nothing whatever to do with the making of the award further than to pay any expenses which your honorable board may deem it necessary or wise to incur, either in the employment of experts, the giving of hearings, or the conduct of experiments—this in order that no effort may be spared to achieve the desired result."

Artesian Wells for Electric Lighting.

The cities and towns that are not fortunate enough to be near a flowing stream, or so situated as to be easily reached by coal cars, have another resource for power. Artesian wells furnish the means, and experiments in South Dakota have shown that they are not only an excellent source of power, but that they are economical and inexpensive to maintain.

Near the city of Redfield, S. D., what is known as the Hassell-Myers artesian well has been furnishing sufficient power to serve the needs for lighting the city, reports the *Electrical Review*. It was originally intended for irrigation purposes, and the cost of its simple construction was \$3000. Sinking to a depth of 1030 feet, the bore of the well is lined with piping from top to bottom, while outside of this six-inch pipe, extending from the surface down through the drift for a distance of 150 feet, is an eight-inch pipe which serves as a strengthening casing. The water comes from a stratum of clear, white sand, and is soft and clean. The flow is 2027 gallons per minute, and the entire volume of the water is thrown 16 feet above the pipe. From a two-inch opening the wa-

ter is thrown 158 feet into the air. The closed pressure of the well is 165 pounds to the square inch, and with a two-inch pipe the pressure is 128 pounds, while with an opening three-fourths of an inch larger, it is but 95 pounds.

With a home-made water wheel 50-horse power is being developed, and the Pelton Wheel Company claims that with their wheel at the 2½-inch opening, the well will be good for 100-horse power. At the present moment two dynamos are installed, and furnish current for the city for both arc and incandescent circuits. The lights are remarkably steady, and there can be little doubt of the success of the experiment, if it may be so called.

One mile from this well is another of smaller diameter, but of equal pressure. The sand formation in which the water is found crops out at the base of the Rocky mountains, and also in the beds of the Upper Missouri and Yellowstone rivers. If such be the state of affairs and the beds are the same stratum, the supply of water would be comparatively inexhaustible.

Wells could be sunk in hundreds of places in the vicinity of Redfield, and the water thus obtained could serve as the power for numerous isolated plants. The wells now in existence have been flowing for nearly two years, and no diminution of the supply is apparent.

Here, then, is a fertile field for small and even large manufacturers, and if the industry is successfully managed great inducements could be offered.

The owners of the plant state that it pays a yearly dividend of 15 per cent on an investment of \$15,000. The prospect is glittering enough. Who could ask for more?

New Electric Locomotive.

An electric locomotive of 1000-horse power is reported to be under construction in London from the plans of Sprague, Duncan & Hutchinson to the order of the North American Company. It is intended for slow speed and heavy traction in switching service. The machine is carried upon four pairs of driving wheels, all coupled. The frame is of steel, with deep pedestals. The 56-inch wheels are close-coupled; the first and last pairs only are flanged. There is a motor in each axle, the weight of the armature coming directly on the wheels, and that of the field magnets is on the journals through the pedestals; no spring supports are used. The four motors all form parts of a complete system on a rigid wheel base of 15 feet. The motors are of the alternating type, are wound for 860 volts at 225 revolutions, which will be the equivalent of 35 miles an hour when in multiple.

Blackness of Lamp Bulbs.

Stuart Smith, writing in the *Electrical World*, attributes the blackening of the bulbs of incandescent lamps entirely to a distillation of the carbon, holding that it cannot be due to a combination of the residual vapors in the lamp with the carbon, and a subsequent decomposition of these on coming in contact with the walls, because dissociation is never produced by cooling. The greater rapidity of deposit in new lamps than in old ones he attributes to the glass being a better condenser, when clean, than after a certain amount of deposit has taken place.

Electrocution for Animals.

Electricity is now being utilized for killing homeless dogs and cats at Hartford, Conn., says the *Chicago Journal of Commerce*. In the rear of the police station there is a cage just large enough for a dog to stand in, fitted up with electrical connections. The fore feet of the animal rest upon one electrode and his hind feet upon another, and when he is in position an electric current is switched on and he is put to death on the same principle as criminals are executed.



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Mining Summary.

The following is mostly condensed from journals published in the interior, in proximity to the mines mentioned.

CALIFORNIA.

Amador.

STROCK THE LEDGE.—Amador Ledger: The Hardenburg mine, which was on the verge of shutting down upon the 1st of December, did not do so, and since that time has encountered the much sought-for ledge in north drift at the 800 foot level. For some weeks they have been following up the ledge which they first struck as a small stringer, and now it is between seven and eight feet in width. Charles D. Lane, who handles the property for the partnership, was here last week and brought Tom Pollen of the Altaville foundry over to look at the mill-site and give an estimate of the cost of the construction of a new hoist. Already several extra men have been put to work, though they are still drifting along the ledge. The rock taken out is put in the ore bins and the mill will probably be started up as soon as the new hoist is in place.

The following were elected trustees at the recent annual meeting of the Kennedy Mining Company: John Barton, president; D. E. Hayes, vice-president; John Taylor, F. Reichling and W. W. Belsbaw; L. F. Reichling was chosen secretary and J. F. Parks superintendent. For the fiscal year ending Nov. 30, 1893, the mine yielded 35,668 tons of ore. The face value of the gold bullion after paying cost of assay and express charges to San Francisco was \$646,552; dividends, \$460,000.

H. D. Emerson has arranged to work at mining in the Gwynn canyon during the balance of the winter and the coming spring.

Butte.

BRISK FORBESTOWN.—Grass Valley Union: Forbestown, in Butte county, is now quite an important mining town. The Bullion Consolidated and the Mt. Hope mines will both start up ten-stamp mills in a few days. These will make six mills running in the Forbestown district, with a total number of 110 stamps, and two big chlorination works.

VALUABLE DISCOVERY.—Oroville Register: R. W. Miller & Co. have struck a mine near Oroville that promises to rival any in the county if it develops as well as it now prospects. The shaft is only down 15 feet, but neither side touches the edge of the lode, so that the ledge is wide. The quartz contains considerable free gold and is rich in sulphurets. Mr. Miller is a miner of many years experience, and 30 years ago mined in this vicinity. Since then he has been in Colorado. The ledge is three or four miles up the river on the east bank. It is a matter of significance that the lode is directly opposite the famous Banner mine. Mr. Miller and his partner are working energetically to open up this quartz deposit and bring to light its hidden riches.

A LIVELY DISTRICT.—Forbestown New Era: The Standard mill in Oregon City is running on excellent ore and making big clean-ups. It is reported that the sulphurets from the ore upon which this mill is running assays as high as \$1000 to the ton, and that as much as a ton has been obtained from a single day's run. There are two other quartz mills in that vicinity paying well. Work has been commenced upon the old Banner mine. New and improved machinery is being put in the mill, and it will soon be in operation again. The company now owning the Banner are heavy capitalists, and it is their intention to work the mine mill for all there is in it. In early days several hundred thousand dollars were taken from this mine, and there is every reason to believe that there is just as good ore in the ledge as has ever been taken from it, and we expect in a short time to hear of big strikes being made.

TO BE SOLD.—Oroville Register: It is confidently stated that the Banner mine is soon to be the banner mine in Butte. The ledge has been sold to an English syndicate and active work will soon be commenced. As an indication of this, we learn that a contract has been let for cutting 1000 cords of 4-foot wood. The recent discovery of extremely rich ore in the mine led to the reported sale.

SHUT DOWN.—Deadwood Cor. Mercury: The Rainbow mine has been shut down for the winter, as it is inconvenient to handle the water with the machinery which they have at present. It is reported that the company will resume operations next spring, and sink the shaft 200 feet deeper. The ledge is not undeveloped, and the work on the mine has been prosecuted with a determination and management that will make it a success if there is anything in the ledge to warrant it.

Calaveras.

THE NORTH STAR MINE.—Prospect: The owners of the North Star mine, otherwise known as the Maguire mine, in Happy Valley near Mokelumne Hill, have made extensive preparations and are now ready to prosecute work on a large scale. It is the intention of the company for the present to work the mine by the hydraulic process, so that all the old drift works and caved ground extending back for about 300 or 400 feet can be washed off, after which it will be worked by drifting and milling. There is about 60 feet of blue gravel which prospects well throughout, and recently our reporter was shown some "chips" taken from this gravel valued at from \$20 to \$40 each. About 3000 feet of bedrock flume, lined with five-inch blocks, have been laid, extending from the mine down Buckeye gulch, and about 900 feet of 11-inch hydraulic pipe have also been laid. A No. 2 giant will be used and about 400 inches of water will be run under a 225-foot pressure. A blacksmith shop, store-room and changing-room for the miners have

been erected and everything is now ready for a start as soon as the decision of the Debris Commission is received, application for a permit to run having been made some time ago. There is no doubt but that the application will be granted, as the tailings will be run on ground where they can be easily kept back. The mine is under the efficient management of C. M. Burleson, a mining engineer, and one who has had extensive experience in both hydraulic and quartz mining in this and other counties of the State, and the work is under the foremanship of A. and W. W. Cook, two of the veteran hydraulic men of the county.

The North Star is one of the best-known mines in that district, having been worked for years on a small scale, but the greater part of the mine yet remains untouched. On several occasions different parties endeavored to purchase the property, but Mr. Maguire, the former owner, would not part with his "bank," as he called it, upon which he could always draw when he needed money, until about three or four months ago he finally concluded he would sell and the mine was bought by Messrs. Haven and Ewing of San Francisco, who now own the same.

Nevada.

A GOOD CLEAN-UP.—Telegraph, Jan. 5: Today a clean-up of 110 loads of ore was completed at Joe Southern's mill, and the yield was about \$30 per load, or \$3300, not including sulphurets or headings. The ore was from the Wisconsin mine, and was taken out by Messrs. Henley & Co., who have the mine leased. The rock came from the depth of about 200 feet. There is more good ore in sight at the Wisconsin.

A NEW ROAD.—Transcript: Fred Zeidler and Chris Mallon have returned from North Columbia, where they have been looking up, for San Francisco parties, a site for a new road to commence at the Bloomfield stage road on Grizzly Hill and connect with the Lake City road at North Columbia. If right of way can be secured, a road will be built which will be of great benefit to the people of the ridge. It will shorten the distance by the present road by way of the Purdon grade seven miles. This will enable teams to leave Nevada City in the morning and deliver freight at the St. Gothard, Delhi, Grizzly Ridge, West Delhi, Cornow, Eclipse and other mines in that district the same day. As the mining outlook is very encouraging in that section a road is very much desired. With the exception of one party the right of way has been secured.

MINES CLOSED DOWN.—Transcript, Jan. 4: The West Harmony and Odin gravel mines and the Federal Loan quartz mine had to suspend operations to-day, on account of the water in their ditches freezing. To-morrow steam power will be used at the Odin and West Harmony and work will be resumed.

THE HOME MINE.—Transcript, Jan. 3: The shaft at the Home mine, on Deer creek, is down 120 feet. It will be sunk 250 feet before any drifting will be done. At present the ground is very hard and the quantity of water great.

THE CALIFORNIA.—Transcript, Jan. 5: The Gaston Ridge Mining Co. is repairing the mill at the California mine, in God's Country, and putting it in good order, so that it will be ready to run as soon as there is rock from the mine to crush. Men are also engaged in clearing out and putting the mine in shape to resume operations in a short time. At present there are 12 or 15 men employed, but the force will be increased as rapidly as room is made for more men. It is the company's intention to open up the mine thoroughly and work it on a large scale.

COL. C. W. TOZER, the superintendent, informs us that as soon as spring opens the capacity of the mill will be increased by the addition of 20 stamps more. Steam is the motor that has been used to run the mill. This will be changed when the mill is enlarged, and either water-power or electricity substituted. If the former is used the power will be transmitted from the water-wheel to the mill by means of a long wire cable. Should electric power be decided upon, and Col. Tozer thinks very favorably of this scheme, the necessary current can be easily generated by water-power and transmitted to the mill. If they use electricity it will be an innovation in this county in the way of power for mining purposes.

THE SEASTAPOL.—San Francisco Call: Mr. E. H. Baxter, the mining operator, has handed the Sebas'apol mine at Grass Valley. This property was worked by the Watt brothers to great advantage in early days, when a fire destroyed the mill and hoisting works, and the property has remained idle ever since. It lies on the same ledge as the Empire and other noted mines, and it is the intention to open up the mine and thoroughly prospect it at an early date.

Placer.

CRUSHING ROCK.—Republican: The new mill at the Three Stars mine is now crushing rock, and thus one of the most important mining enterprises in this part of the State has been entered upon. This mill is one of the finest in the State, and the property on which it is situated gives great promise of a future yield of the yellow metal. Success at the Three Stars means prosperity for the mining interests of the Ophir district.

MINES PAY WELL.—Colfax Sentinel: The mine on Bushy, near Forest Hill, owned by Mr. C. Albrecht and others is paying very well. This mine is located near the one of Cranage & Federer, and is becoming quite celebrated for its richness.

The Gold Ring mine at Green Valley promises very well. It is expected the mill will be all ready for work in about a week. Several nice specimens of cement have been taken out in excavating for the mill, and much finer ones are expected when the work in the main part of the mine is begun.

The Golden Eagle at Shady Run is also push-

ing ahead. At present a new tunnel is being run to tap the gravel, so that it may be worked to better advantage. It is expected the tunnel will be finished and gravel be taken out within two months.

The Redstone quartz mine at Blue Canyon has resumed work, and it is now being worked in a systematic way. A good company has the mine hooded and expects to develop it into a good property.

The Paragon mine at Bath laid off quite a number of men Christmas, but it is expected they will soon be put to work again.

The Mayflower mine is working a full force of men and is paying as well as ever.

The Dardenelle mine prospects well, but some trouble with the machinery has been had of late that has interfered with its working. It is all right again, and the mine will soon begin to pay as well as formerly.

The Big Dipper mine at Iowa Hill is rapidly developing into one of the best drift mines in the county. The gravel is rich and the machinery works splendidly. About 40 men are employed at present.

Considerable development is promised in the Black Canyon section and near Sailor Canyon and Bald Mountain the coming summer. In fact, everywhere throughout the mining sections of Placer there is a renewed activity and an increased interest in mining properties.

ANOTHER DIVIDEND.—Colfax Sentinel: The Morning Star mine at Iowa Hill declared another dividend of \$3 a share last Wednesday. This is dividend No. 37, and is but in keeping with the mine's past record. There are about 40 men working at the mine at present, and the indications for the future are bright indeed. This mine pays out about \$3500 every month in wages. This for a year is equivalent in value to about twice the entire amount of fruit shipped from Colfax last season.

Plumas.

WITH REDUCED FORCE.—National-Bulletin: Work at the Crescent mine continues with a reduced force. There is nothing new in connection with the property to report.

At Green Mountain 30 stamps are crushing ore steadily, with fair results.

Considerable prospecting is going on between Green Mountain and Round Valley Reservoir, and some important developments have been made, which we will note later on.

Work on the Kellogg property, below Elizabethtown, is progressing favorably. The hoisting works of the Loring & Leavett mine have been taken down and moved, and the work of rebuilding is now in progress. Probably less than ten days' good weather will enable them to get under cover.

A. B. White, superintendent of the Quincy Mining and Water Co., was in town Wednesday. Work on the big dam will begin in a few days, and when finished everything will be ready to begin mining when the water season opens.

Sierra.

GONE TO WORK.—Messenger, Jan. 6: John and Louis Bernhardt have gone to work at the Oxford (old Good Hope) quartz mine, a couple of miles above town. This is known to be a good mine, but the financial circumstances of the owners forbid its proper development at the present time.

It is rumored around town that the men at work under Mrs. Kenn's restaurant, on Main street, have struck a pretty good piece of ground. Jack Woodside and Dick Osborne are running the mine and have four hired men. They work two shifts. In early days the ground under Main street, as far as worked, was enormously rich, but on account of lack of grade to drain the water very little of the channel could be worked.

Tuolumne.

RICH STRIKE AT RAWHIDE.—Amador Ledger, Jan. 5: Jas. E. Dye, of the Amador gold mine, drove over to Sonora about Christmas time and spent holiday week with his friends, the Nevills, at the Rawhide mine near that town. He says that they have struck it rich in that mine. In the 400-foot level a vein of quartz was struck which prospecting well, and when it was again encountered on the level below, it was four feet in width and immensely rich. They are running ten stamps at present, but will start more as soon as a plant for saving the slimes, upon which they are now at work, is completed. The Rawhide was one of the early-day gold producers and lay idle supposedly worked out for many years until Nevills, Ballard and Martin took hold of it about three years ago. They have put a great deal of money into it and worked faithfully until rewarded with a remarkably rich development. Besides the rich ledge of rock which is above referred to, they have opened up and prospected a 30-foot ledge which in free gold mills \$10 per ton. Besides the Rawhide, Mr. Nevills is opening up the App and the Alameda, both in the same section of country. In the former he has found a ledge which produces \$50 to the ton. Mr. Nevills has surely made a great strike in Tuolumne county, and could doubtless close out his interest there now for a million dollars. He is now considering the advisability of reopening work in the Mammoth tunnel and also at the Moore mine near this town.

NEVADA.

Washoe District.

SUMMARY OF CUMSTOCK OPERATIONS.—The report of Superintendent Lyman of the Consolidated California & Virginia mine, for the past week, says: "1650 level.—In our workings in and from the drift run north from the foot of the npraise which was carried up from the sill floor of this level, we have been engaged during the week in retimbering and prospecting without extracting any ore. Have also employed the time in the vicinity of the winze (20 feet

down) sunk from the west crosscut from the main northwest drift in timbering and prospecting. The southwest drift (the Rule drift) from the 1000-foot station of the Consolidated Virginia shaft, has been advanced during the week 60 feet; total length, 265 feet; face in porphyry somewhat harder and clay with streaks of quartz."

Superintendent Kervin reports as follows of the work on the 900 level of the Best & Belcher mine: "900 level.—The east crosscut on north line has been advanced 25 feet; total length, 535 feet; face in hard porphyry."

On the 1465 level of the Ophir mine, the north drift from the west crosscut is out 42 feet. The face is in porphyry and clay separations. In the Mexican Mine, on the 1465 level, the west crosscut from the south drift from the top of the npraise is to 88 feet. The face is in porphyry formation with clay separations. On the 900 level of the Union shaft the Sierra Nevada and Union Con. joint north drift from the joint west drift is in 344 feet. The face is in porphyry and clay. On Cedar Hill the Sierra Nevada south intermediate drift is in 350 feet. The face is in porphyry. At the Andea mine, on the 420-foot level, they are preparing to drift north in the ore formation lately encountered in the west crosscut. In the Gould & Curry mine, on the 200 foot level, west crosscut No. 5 is out 329 feet. The face is in hard porphyry.

In the Hale & Norcross mine on the 1300 level they continue stoping ore from the winze below this level and extracted during the week 23 cars of ore, assaying \$33.33 per ton per car sample, and 3 cars of ore, average assay per car sample \$14.97 per ton. In the Chollar mine they are making repairs in main shaft below 850 level. Extracted and sent to the mill the past week 162 tons and 800 pounds of ore from the 100 level. Milled during the week 112 tons. On hand at mill, 107 tons. Average battery assays, \$29.11; average car-sample assays, \$33.99; bullion shipped to Carson mint, 371 pounds. In the Potosi mine they have started an east crosscut 300 feet south of east line, 750 level, which is now out 30 feet; face in porphyry. The south drift, 200 feet east of Potosi winze, 1100 level, is out 205 feet; face shows porphyry. Are repairing the south drift, 930 level, and making some repairs in the Potosi winze below the 1100 level. At the Ward shaft the west drift from the station, 520 level, is out 425 feet from the shaft; face in clay and porphyry. At the old Alphashift, repairs are still being made.

OREGON.

THE MOUNTAIN LION.—Jacksonville Times, Jan. 4: The company now in charge of the Mountain Lion mine, in Josephine county, has run a 120-foot tunnel since Dec. 1st. They are running day and night and taking out considerable ore of a good quality.

The Ashland Mining Co. has resumed operations on their 600 foot tunnel, upon which work was stopped last August on account of scarcity of water. They are running the Burleigh drill steadily and expect to reach the ledge in February.

The mine in Josephine county, of which a three-fourths interest is owned by Deyoe, Brown and Hand, is to be developed. Those gentlemen have bonded their interest to a Mr. Murray for \$30,000. J. W. Brown and son and Louis Dyer will go out from Albany to commence operations for Murray at once.

It is said that a ten-stamp mill will soon be put up by J. C. Lawis, the Portland mining man, on the Green quartz mine on Galice creek. This mine has been worked occasionally for the past 18 years, and has proved to be a paying property.

Work on the Mountain Lion mine is being pushed vigorously. A new quartz mill will soon be placed in position, to take the place of the arrastra now in use. First-class ore is being taken out.

Messrs. Boynton, Razee and Tohler of Grant's Pass, who have been prospecting the old Thompson creek ledge, have received sufficient encouragement to put up a five-stamp mill, which is expected to arrive before long. They have struck a well-defined and rich vein of quartz.

THE WHITE SWAN.—Baker City Democrat, Dec. 25: In conversation with Mr. Tarbell, who is the owner of a one-third interest in the property, he stated to a reporter that there was no reason to withhold the amount of gold produced by the White Swan from the public and he thought that as a matter of justice to the mining interests of the county the public ought to know. The last output was referred to and Mr. Tarbell stated that the amount was \$4000, the result of a run for eight days. In other words the White Swan was turning out bullion at the rate of \$500 per day. The ore bins are full of this kind of ore and the mine according to Supt. Nivens' report never looked better than at the present time.

WORKING THE TAILINGS.—Rogue River Courier: Cheney, Spencer & Hayes own a paying placer mine about a mile from Waldo. They are working 50 acres of tailings which are estimated to be worth \$100,000, as the early-day miners were not very careful about picking up the fine gold, and even let a good many good-sized chunks of amalgam run over their rifles.

ARIZONA.

THROUGH GOLDFIELD CAMP.—Yuma Times: We visited the Geneva mine, where about 26 feet of work is done, showing very good quality of ore. From there we went to the Prospector, where about 18 feet of work has been done. Next to the Refusal; this is the complicated ledge carrying gold, silver and galena. Here 40 feet of work has been done, showing a 65-foot vein. From thence to Needle, which has a 100-foot vein, which assays \$10 to the ton across the 100 feet of ledges. Mr. Leach of Tombstone is interested in this claim. From the Needle to the Emerald claim, where the

Pomeroy hoye have done considerable work. Thence to the Treasure Vault. Mr. McFarland and Mr. Coewell, who are interested in the claim, panned out a little gold, some of it quite coarse, to show us what they had. They have done considerable development work and it shows for itself. We went over to Mr. Pomeroy's High Flyer claim and found a lot of work done in cutting and sinking. From there we went to the Sylva claim. Here we found a fine foot wall, which can be traced for some distance on the surface. The claim has had but little work done on it, but the first of January it will be developed, when it will count on assessment work. From there we took in the Black Queen, belonging to the Mammoth Mining Company.

LITHOGRAPHIC CLAIMS RECORDED.—Arizona Enterprise, Jan. 4: Mining locations for a group of five claims, the same from which the lithographic samples have been on exhibition in this city, were filed yesterday in the county recorder's office. They consist of the Lithographic, entered in the name of B. Robles; the Quarry Group and the Side Quarry, in the name of L. Snaetegui; the Winall Quarry, W. A. Dalton; the Lithograph Quarry, Adolfo Vasquez; and the Cardwell Quarry, Wm. J. Jones. These claims lie two and one-half miles south of Arivaca, on the Oro Blanco road.

GETTING OUT GOOD ORE.—Mohave Miner, Jan. 7: Al Ross and Charles Mackenzie are working on the old Rawhide mine and are getting out rich ore. There is over 1000 tons of ore on the dump of the mine that will run over one hundred ounces in silver that is perfectly free milling. If a mill was put up in that country plenty of ore could be had to keep it running all the year round. Two sacks of ore in a recent shipment from the Rawhide mine netted the owners over \$1300.

Chicago parties are talking of putting a mill at Stockton Hill. The right kind of a plant would pay well.

One of the mines at Ferguson has just been sold for about \$150,000. It is a good property. Reports from Tomahstone give a rather gloomy account of affairs in that place. Nearly all the mines have closed down because of the constantly decreasing value of silver. Last week the only mine employing men shut down and put on a watchman.

J. A. Healy, F. A. Healy and Charles Price have bonded five copper properties on Bill Williams' fork to Eastern parties for one year. Five thousand dollars has been deposited in bank with which to commence development work. The mines show up well in copper on the surface, and if they develop well a smelter will be erected on the ground.

MONTANA.

THE FIRST ORE TRAIN.—Butte Inter-Mountain, Jan. 3: Work was resumed in earnest on the Anaconda Hill to-day. The Green Mountain, High Ore, Anaconda, St. Lawrence and Mountain Consolidated mines are all at work again. At the latter mine the full force was not put on to-day, but Larry Manning, in charge there, said they would be raising ore to-morrow.

Some repair work on the ore chutes and in the mine are going on. This mine had 400 men at work during November. The first train-load of ore over new B. A. & P. railway was made up at 3 o'clock to-day from the Green Mountain and Anaconda mines. It consisted of 75 carloads.

All is lively on the hill to-day. Business men say hundreds of miners have been buying boots and coats, etc., for underground work. It is expected before to-morrow morning 175 carloads of ore will have been shipped over the new line.

FOR A LONG TUNNEL.—Butte Inter-Mountain: The Bi-Metallic Company is advertising for bids, to be submitted January 15th, for driving and timbering a drain tunnel about 6170 feet long from the west face of the 1000 foot level of the Blaine shaft to Boca on Douglas creek. The first tunnel is to be 2075 feet long and the second 4106 feet long, each to be four feet wide and eight feet in the clear. No bonds will be required from the contractors, but the company will hold back a percentage of the estimates. Cessation of work five days will be deemed abandonment, and the company reserves the right, on 20 days' notice, to terminate the contract by purchasing the supplies the contractors may have on hand. All ores extracted in the work shall be the property of the company. It is required that three crews of miners be employed to drive the cross-country tunnel.

The company will furnish, free of charge, hoisting engine and hoilers, air compressors, all pumps, cars, rails and ties, timbers framed and drain boxes ready to put in, at the Parnell and Bi-Metallic Extension shafts. At Boca the company will furnish, free of charge, hoiler, air compressor, machines, cars, rails, cross-ties, timbers framed and ready to put in. The company will furnish at cost drill steel for machines, powder, fuse, caps, candles, picks, hammers, shovels and any other tools needed, also wood, oil, etc., payment for same to be deducted from monthly estimate.

Complimentary Samples.

Persons receiving this paper marked, are requested to examine its contents, terms of subscription, and give it their own patronage, and, as far as practicable, aid in circulating the journal and making its value more widely known to others, and extending its influence in the cause it faithfully serves. Subscription, \$3 a year. Extra copies mailed for 10 cents, if ordered soon enough. If already a subscriber please show the paper to others.

An attachment for \$3000 has been obtained in New York against the Prescott & Arizona Central Railway Company in favor of Miles O'Brien and James Cannon, as receivers of the Madison-square bank, for unpaid interest on \$100,000 of the company's bonds held by the bank.

Notices of Recent Patents.

Among the patents recently obtained through Dewey & Co.'s Scientific Press U. S. and Foreign Patent Agency, the following are worthy of special mention:

ELEVATOR.—William B. Morris, Seattle, Wash. No. 511,447. Dated Dec. 26, 1893. The object of this invention is to provide an elevator with a novel means for moving the cage or platform up and down. It consists essentially of short-jointed bars connected together and acting to push the cage or platform up or allow it to be depressed. These short bars fit around a rectangular drum at the bottom, around which they fold in the same manner that rope coils upon a round drum when the elevator is down. When the elevator is to be raised, it is forced up by rotating this drum so as to uncoil and extend these jointed links which move up in suitable guide channels in the sides of the elevator shaft, and thus serve to push the elevator up.

CHANDELIER CAR LAMP.—Emile Boesch, San Francisco. No. 511,338. Dated Dec. 26, 1893. This invention relates to improvements in car chandelier lamps. Its object is to provide an oil lamp fixture having an argand burner with a closed air chamber below, receiving an air supply through conduits from above or on the outside of the roof or ceiling from which the chandelier is suspended, a means for more perfectly regulating the draft and the escape of products of combustion, thereby giving a better light with the same size of wick, avoiding smoke and smell and the blowing out of the flame by sudden gusts of wind, and for opening or cutting off the oil supply from the reservoir. This is all carried out by details of construction which are not easily explained without illustrations.

AUTOMATIC DELINEATING MACHINE.—Fred Bangerter, S. F., Cal., assignor to the Automatic Novelty Manufacturing Company. No. 512,089. This invention relates to an automatic mechanism by which stated figures can be marked, written, drawn, or engraved, and may be used to either make letters, draw figures, or engrave upon surfaces. For purposes of amusement the apparatus is enclosed in a figure, the hand of which carries the delineating instrument, and when the apparatus is set in motion it moves the hand so as to write the letters or make the figures or delineations required. It consists of a series of gears, came and connected levers which are actuated thereby so as to produce the desired letters or figures.

PIANO.—Henry Muller, Stockton, Cal. No. 512,048. This invention relates to improvements in pianos, and its object is to provide a means for fixing the sounding-board to the iron frame so as to obtain the best resonant effect, a means for holding the tuning pins in the frame and automatically keeping them tight, and a sounding-box or resonance conductor within which the ends of the strings opposite to the tuning pins are secured, this box serving to increase the resonant effect of the strings. It also relates to an improved agraffe and adjustable dampers which are applied to the strings as occasion requires.

PNEUMATIC BRAKE.—Francis M. Speed, S. F., assignor to the Pneumatic Brake Company of same place. No. 512,233. Dated Jan. 2, 1894. This invention has for its object the efficient, safe and economical use of compressed air for the purpose of applying brakes. It consists of a braking mechanism on the car, a brake cylinder for operating it, a main reservoir on the car in which air under high pressure is stored, supplementary reservoirs also on the car adapted to receive air under different pressures, outlets from the supplementary reservoir connected with the brake cylinder and a multiple way cock common to all said outlets, whereby air under different pressures may be admitted to the brake cylinder.

AIR AND WATER PURIFIER.—Dr. C. F. Buckley, S. F. No. 511,995. Dated Jan. 2, 1894. This device consists of a reservoir or tank for the water, having an inlet and an outlet, an air disinfectant and an automatically operating connection between said air disinfectant and the reservoir or tank, whereby the water in the reservoir is subjected to contact with disinfected air only. The object in view is to avoid contamination of water by non-disinfected air, and to provide simple and effective means for this purpose, adapted to be used by every household.

METHOD OF UNITING METALLIC SHEETS.—James Gould, Jr., Oakland, Cal. No. 512,021. Dated Jan. 2, 1894. This method consists first in overlapping the adjacent ends of the sheets; second, forcing from one side both thicknesses of metal to form protruberances or bulging portions on the other side, severed from the metal on their sides and remaining joined thereto at each end; and third, altering the superficies of one part with relation to the superficies of the other, whereby the parts are prevented from returning to their first position.

PUMP ENGINE.—Levi Holben, Sacramento, Cal. No. 511,426. Dated Dec. 26, 1893. This engine is simple, compact and effective, being especially adapted for pumping purposes, as it provides for a constant and equal flow of water. It consists of a cylinder seated on top of the pump pipe. The piston rod is connected directly with the pump rod, and the piston has also a stem extending upwardly through the top of the cylinder. Upon the side of the base of the cylinder is a valve which controls the inlet and exhaust passages under the piston. The

valve is operated by connections with the upper piston stem or rod. The stem lifts the piston, the latter returning by the weight of attached parts. Upon the piston rod is a displacer operating freely in the upper end of the pump pipe, whereby a constant flow of water is had.

HAIR-CLIPPING MACHINE.—Ole Olsen, Oakland, assignor of one-half to Charles Greene of San Francisco. No. 511,966. Dated Jan. 2, 1894. The essential novelty of this machine is a hinge connection between the handle and the center-head and suitable power transmitting connections which will act in any position of the center-head. The object of the machine is to adjust the center-head to varying positions, thereby adapting the device for the most convenient operation under all circumstances and in different places.

Coast Industrial Notes.

—All the shingle manufacturers in British Columbia have joined an association to keep up prices.

—The State Board of Examiners will pay no more coyote claims until a specific appropriation is made by the Legislature.

—The cold weather last week was a great boon to the "ice farmers" in the mountains. One company for the first crop harvested 3500 tons.

—So far, twenty-one sealers have left Victoria this season, being one-third of the entire fleet. They have carried with them 483 whites and 74 Indians.

—An exchange says that the locomotives of the Shasta division of the Southern Pacific are soon to be supplied with electric headlights. A motor will be placed in the cabs.

—A new receiver has been appointed to handle the finances of the Oregon Pacific Railroad Company, in place of E. W. Hadley, who resigned a few days ago. The new receiver is Charles Clark of Portland, Or.

—Official statistics, just compiled at Port Townsend, show 2350 Chinese passengers in transit from the Orient, by way of the Canadian steamers, landed in Portland and Astoria last year. With the exception of 500, all obtained admittance as merchants.

—The Pacific Coast Council of Trades, in session at Sacramento, has declared in favor of the municipal ownership of gas, electric light, waterworks, street railways, the nationalization of telegraph, telephone and railway lines, and postal savings banks, compulsory education up to sixteen years, and eight hours' labor a day.

—Two large ocean steamers are now en route from the Atlantic coast for Puget Sound; they will arrive there some time next month, and will carry passengers and freight between Sound points and San Francisco during the Midwinter Fair period. The vessels are said to be the property of the Canadian Pacific Railroad Company.

—The Governor has appointed the following delegates from the State at large to the Transmississippi Congress which is to be held in San Francisco: A. P. Williams of San Francisco, J. M. Walling of Nevada City, J. A. Louttit of Stockton, J. P. Widney of Los Angeles, Joseph Brown of San Bernardino, D. E. Knight of Marysville, Charles McCreary of Sacramento, W. D. Tupper of Fresno, M. A. Luce of San Diego and C. H. Phillips of San Luis Obispo.

—The reported consolidation of the Southern Pacific Milling Company and the Southern Mill and Warehouse Company is affirmed by Manager F. H. Wheelan of the latter corporation. The consolidation will now be known as the Southern Pacific Milling Company, with headquarters at San Francisco. The warehouse company's interests were confined to Santa Barbara and Ventura counties, with the central office in this city, while those of the other lay between Santa Margarita and Soledad.

—The preliminary work for the building of an electric road from Ione to Sutter Creek and Jackson, and the putting up of an electric light plant in conjunction with the enterprise, at Sutter Creek, are attracting a great deal of attention at present in Amador county. The latter will supply Sutter Creek, Jackson and Amador City with light, and the company has a water fall of 600 feet at the first-named place to supply the power. J. S. Emery and Abner Doble, of this city, are at the head of the new improvements.

—C. F. Crocker states that the question of beginning work on street railway extensions across the bay is under consideration. It is quite probable work will be begun shortly. The proposed extensions would add about three miles of track to the system owned by Southern Pacific officials in Oakland. The principal work would be the construction of an electric line along San Pablo avenue from the terminus of the cable road to University avenue, West Berkeley.

Another extension is the continuation of the cross-town line, which extends from Telegraph avenue to Larkin. This extension would be west on Alcatraz avenue to San Pablo avenue, where it would connect with the extension to West Berkeley. These extensions would make the means of communication in the urban territory lying between Oakland and Berkeley as complete as those which now exist in Oakland.

—The withdrawal of W. F. Whittier from the firm of Whittier, Fuller & Co., is announced. Official evidence of this fact is afforded by the filing of articles of incorporation of W. P. Fuller & Co. The directors of the new corporation are: W. P. Fuller, J. F. Littlefield, A. B. Perry, Margaret H. Fuller and Bertha A. Fuller. The capital stock of the new concern is \$2,000,000, all of which has been subscribed, as follows: W. P. Fuller, \$439,800; J. F. Littlefield, \$100; A. B. Perry, \$100; Margaret H. Fuller, \$1,120,000; Bertha A. Fuller, \$220,000; Ella F. Fuller, \$220,000.

—George G. Buckland has made application to the Board of Supervisors for franchises for an electric road over a large number of San Francisco streets. The cars are to be operated by the storage system, or by an underground wire, but not by trolley. Mr. Buckland pledges himself to begin work in thirty days, to spend \$50,000 in sixty days, \$200,000 in ninety days, \$500,000 in six months, and to have the whole road in operation in three years' time. In addition to the two per cent gross annually to which the city is now entitled from the earnings of a cable company, he offers to pay to the city five per cent weekly of the gross earnings as a bonus for a fifty-year franchise.

—The Folsom Telegraph learns that the big chute which has been under course of construction by the American River Land and Lumber Company during the past year is nearing completion rapidly. About 800 feet remain to be done. The chute is 3000 feet long, and the top of the same is 1200 feet higher than it is at the bottom. Logs 30 inches thick are used in its construction. There are seven of them—one forming the bottom and three on each side, making a V-shaped flume of it. Among the cribbing that has been built is one place over Slab creek, 200 feet long and 50 feet high. This is built up of solid logs placed one on top of the other. In this pile of logs there has been an opening left for the water of the creek named to flow through. This opening or water-way is 20 feet high and 10 feet wide, and all the water will go through it easily. The work will be finished some time in February, and as soon as possible thereafter the logs will be put into the chute and slid down to the river.

—Walter Cheadle, a Carson business man, in an open letter, advocates the building of a railroad from Carson to the Sacramento river, through Carson, Fredericksburg and Diamond valley, around the south end of Lake Tahoe, through Lake valley, then over the hill to Strawberry, down the American river to Placerville, and from there to the Sacramento river, putting the State in direct communication with the ocean and making Nevada a competitive point. He advocates the building of a road by the State by the issuance of three-per-cent bonds for \$3,000,000, redeemable in 50 years, with the Governor, Controller, Treasurer, Surveyor-General and Attorney-General as the board of directors. He advocates the formation of a new party, electing legislators on a platform which inflicts the death penalty on all who sell out to competing roads. He would make the Governor superintendent, with the power to appoint an assistant. He would fix the passenger rate at \$5 for a round-trip ticket to San Francisco, half a cent a pound the freight rate and \$10 for a carload.

—The Southern Pacific Company is about to get its Oakland street-car business together into more compact and systematic shape. Ever since the corporation bought James G. Fair's Oakland street-car lines, along with his narrow-gauge roads, its street railways across the bay have been owned by three separate corporations. It has been decided that it would be more convenient to have one company control all the lines and do all the business. In accordance with that decision, there have been filed with County Clerk Haley articles of the Oakland Railroad Company of San Francisco, which in the future will own the 12 7-8 miles of Southern Pacific street-car lines across the bay. There is \$2,500,000 worth of capital stock to declare dividends on. It is divided into 25,000 shares. The Directors for the first year are C. F. Crocker, H. E. Huntington, S. T. Gage, C. E. Green and F. S. Doughty, who have already subscribed for twenty-six shares of stock each. It is understood that no changes in the operation of the roads will follow.

Market Reports.

The Markets.

SAN FRANCISCO, Jan. 11, 1894.
The silver market during the week has shown improvement, both at home and abroad. Copper is weaker. Lead has again receded.

Quicksilver.

The receipts of Quicksilver at this port in 1893 were as follows:

Months—	1893.	1892.
January.....	2,243	1,701
February.....	2,388	1,543
March.....	1,588	1,875
April.....	1,623	1,901
May.....	2,511	1,598
June.....	2,790	1,614
July.....	2,014	1,632
August.....	1,919	2,013
September.....	1,281	1,753
October.....	2,718	2,171
November.....	2,352	1,881
December.....	2,617	2,004

Totals.....25,034 21,686
Against 14,556 in 1891, 13,130 in 1890, 15,705 in 1889, and 21,030 in 1888. As compared with 1892 there was an increase of 4,348 flasks in the past year.

EXPORTS.

The exports of quicksilver from San Francisco by sea during December, 1893, were as follows:

To—	Flasks.	Value.
Mexico.....	181	\$ 6,244
Central America.....	100	4,000
Australia.....	100	4,000
Hongkong.....	2,500	80,000

Totals.....2,881 \$94,244
During the twelve months ending December 31, 1893, the exports were as follows:

To—	Flasks.	Value.
New York.....	6,450	\$261,050
Mexico.....	3,899	159,592
Hongkong.....	3,800	122,000
Australia.....	1,250	51,325
Central America.....	794	32,033
Otario.....	280	11,200
New Zealand.....	87	3,384
British Columbia.....	11	476

Totals.....16,571 \$641,660
1892.....8,108 334,747

Increase.....8,463 \$306,913
In 1891 the exports by sea were 40,411 flasks, against 36,890 in 1890. The movement by sea in the past year was the largest since 1887, in which the exports were 18,619 flasks.

NEW YORK, Jan. 11.—Following are the closing prices for the week:

	Silver in London.	N. Y.	Copper.	Lead.	Tin.
Thursday.....	31 1/2	68 1/2	10 25	3 10	20 25
Friday.....	31 1/2	68 1/2	10 25	3 10	20 25
Saturday.....	31 1/2	68 1/2	10 25	3 10	20 25
Monday.....	31 1/2	68 1/2	10 25	3 10	20 35
Tuesday.....	31 1/2	68 1/2	10 25	3 10	20 20
Wednesday.....	31 1/2	68 1/2	10 25	3 10	20 20

San Francisco Metal and Coal Market.

ANTIMONY.		QUICKSILVER.	
Per lb. refined, in ear lots.....	@ 13	Home trade, pr.	30 00 @ —
Powdered, do.....	@ 7 1/2	Englab, do.....	@ 20
Concentrated, do.....	@ 7 1/2	Canton tool.....	@ 8 1/2
All grades jobbing at advance.....		Pick & Hammer.....	@ 15
COOPER.		Machine.....	@ 4 60
Bolt.....	@ 23	Toe Calk.....	@ 4 1/2
Shedding.....	@ 20	PIG TIN.	
Ingot, jobbing.....	@ 20	Spot @ B.....	21 1/2 @ 22
Do, wholesale.....	@ 15	IRON.	
IRON.		Bar, base.....	@ 24
Norway, base.....	@ 4 1/2	Spot from yard—PER TON.	
PIG IRON.		Wellington.....	\$8 00
Eglinton @ ton.....	Spot.	Creta.....	7 50
Glenbrook.....	18 00	Nanaimo.....	8 50
Am. Soft, No. 1.....	19 00	Gilman.....	8 00
Puget Sound.....	19 00	Seattle.....	5 50
Olay Lane White, 19 00.....		Ocos Bay.....	5 50
Langlois.....	22 50	Cannel.....	9 00
Gastherrie.....	22 50	Egg, hard.....	12 00
Barrow.....	22 50	Wallend.....	7 25
Carbide.....	22 50	Scotch Split.....	8 00
Carbide.....	22 50	Brymbo.....	7 50
Carbide.....	22 50	West Hartley.....	7 50
LEAD.		TO LOAD—PER TON.	
Pig.....	@ 4 1/2	Australian.....	5 50 @ —
Bar.....	@ 5	Liverpool Steam.....	6 87 @ —
Sheet.....	@ 5	Scotch Split.....	7 00 @ —
Pipe.....	@ 5 1/2	Cast.....	7 00 @ —
SHOT.		Lehigh Lump.....	10 00 @ —
Drop, sizes smaller than B.....	@ 31 75	Cumberland.....	8 50 @ —
Do, B and larger sizes.....	@ 31 75	Egg, hard.....	9 00 @ —
Bag of 25 lbs.....	2 00	West Hartley.....	7 50 @ —
Bag of 25 lbs.....	2 00	Do, spot, in bulk.....	@ 12 00
Bag of 25 lbs.....	2 00	Do, in sacks.....	@ 14 00
Bag of 25 lbs.....	2 00	Cumberland.....	9 50 @ —

Mining Share Market.

SAN FRANCISCO, Jan. 11, 1894.

During last week Consolidated California and Virginia stock, which had dropped from \$6, the highest point of the late deal, to \$2.50, rallied to \$4.50, and the other leading stocks acted in sympathy. The reaction was not well sustained. Another decline came and Consolidated California fell to \$3.50. This occurred Friday morning at the Pacific Exchange. Then came another and a smaller rally, and Saturday morning California touched \$4, but afterward declined to \$3.90 and closed weak, as did the general Comstock market.

Monday of this week there were numerous small fluctuations in the Comstock shares, which made business quite active among the commission brokers. The regular chippers of the street took advantage of the opportunity to turn a nimble sixpence.

Tuesday the market opened quieter and prices had a weaker tone, under the sales of recent buyers. Con. California & Virginia opened with sales at \$4.35. After that there were small fluctuations in the leader and in the neighboring stocks, with much racing between the Boardrooms by small chippers.

Wednesday the Comstock market was active, with numerous small fluctuations in prices. Tuesday

afternoon there had been a weak closing, with sales of Con. California & Virginia at as low as \$3.90, and Wednesday morning in the Pacific Exchange that stock had a further decline to \$3.80. At the second session the market was of a fluctuating character, with alternate periods of weakness and strength.

According to the latest advices the southwest, or so-called "Rule" drift, on the 1000-foot level of the Con. California & Virginia mine, is out nearly 300 feet from the station of the old Con. Virginia shaft, and its face continues in the same formation as reported in Superintendent Lyman's last weekly letter; viz., harder porphyry, with small streaks of clay and quartz.

Board Sales of Mining Stocks.

S. F. Stock Board.

THURSDAY, JANUARY 11, 1894.

9:30 A. M. SESSION.

350 Alta.....	20 1/2	150 Ophir.....	1 75
400 Andes.....	58 3/4	300 Justice.....	2 00
500 B & B.....	2 1/2	500 Mexican.....	1 65
150 Con. Cal. & Va.....	3 80	500 Nevada.....	95c
700.....	3 85	100 Potol.....	75c
350.....	3 90	50 Savage.....	80c
100 Ophir.....	58 3/4	500 Sierra Nevada.....	1 00
100 Crowna Potol.....	45c	500 Union.....	90c
450 C & O.....	350	350 Yellow Jacket.....	1 00

2 P. M. SESSION.

100 Alta.....	20 1/2	100 H & N.....	70c
50 Andes.....	58 3/4	500 Justice.....	2 00
100.....	58 3/4	500 Mexican.....	1 65
300 Belcher.....	7 1/2	100 Occidental.....	10c
800 B & B.....	2 1/2	500 Ophir.....	1 80
400 Challenges.....	40c	20 Potol.....	65c
200 Coblar.....	55c	100 Savage.....	80c
100 Crowna Potol.....	45c	200 Scorpion.....	50c
200.....	55c	500 Sierra Nevada.....	1 00
200 Oaledouls.....	15c	100 Union.....	90c
600 Con. Cal. & Va.....	3 80	300 Union.....	85c
300.....	3 75	500 Yellow Jacket.....	90c
400 C & O.....	350		

Cal. Debris Commission Notices.

THE CALIFORNIA DEBRIS COMMISSION having received petitions to mine by the hydraulic process, from Joseph Hustler, in the Hustler mine, near Cherokee, Nevada Co., and deposit tailings in an old hydraulic pit; from Olonzo Eggle, in the Pomroy mine, near Ono, Shasta Co., to deposit tailings behind dams in the Pomroy gulch; from the Columbian Cold Mining Co., in the Welch mine, near Michigan Bar, Sacramento Co., to deposit tailings behind a dam in a dry ravine; and from the Kate Hayes Mining Co., in the Manzanita and French Corral mines, near Sweetland and French Corral, Nevada Co., to deposit tailings in old hydraulic pits, give notice that a meeting will be held at Room No. 32, Food Building, San Francisco, Cal., on Jan. 23d, 1894, at 1:30 P. M.

Assessment Notices.

STANDARD GOLD AND SILVER MINING COMPANY. Location of principal place of business, San Francisco, Cal. Location of works, Butte County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 18th day of December, 1893, an assessment, No. 1, of five cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the Secretary, at the office of the Company, Room 40, 320 Pine Street, San Francisco, Cal., or to the President, Tyler Beach, St. James Hotel, San Jose, Cal. Any stock upon which the assessment shall remain unpaid on the 28th day of January, 1894, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 17th day of February, 1894, to pay the delinquent assessment, together with the cost of advertising and expenses of sale. By order of the Board of Directors, T. E. JEWELL, Secretary. Office—Room 4, 330 Pine Street, San Francisco, Cal.

FOR SALE OR RENT. THE TOSTON SMELTER.

Specialty adapted for pyritic smelting. Capacity 100 tons per diem. On the Northern Pacific R. R., within a few miles of the extensive gold deposits of Radersburg, St. Louis, Winston, etc. Apply

Manager TOSTON SMELTING CO., TOSTON, MONTANA.

DIVIDEND NOTICE.

THE GERMAN SAVINGS AND LOAN SOCIETY, 526 CALIFORNIA STREET.

For the half year ending December 31st, 1893, a dividend has been declared at the rate of five and one-tenth (5 1/10) per cent per annum on term deposits, and four and one-quarter (4 1/4) per cent per annum on ordinary deposits, payable on and after Tuesday, January 2d, 1894. GEO. TOURNY, Secretary

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MEETINGS.

COMPANY AND LOCATION.	MEETING.	SECRETARY AND OFFICE IN S. F.	DATE
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Crocker Mining Co.....	Annual.....	Aug. Waterman, Nevada Block.....	Jan 15
Del Monte M. Co.....	Annual.....	J. W. Pew, 310 Pine.....	Jan 24
Head Center Cons. M. Co.....	Annual.....	J. W. Pew, 310 Pine.....	Jan 25
Hidden Treasure G. M. Co.....	Annual.....	F. H. Simson, 144 Phelan Bldg.....	Jan 16
Long Star Quartz and Gray M. Co.....	Annual.....	A. W. Blundell, 234 Sacramento.....	Jan 20
Nevada Salt and Sorex Co.....	Annual.....	H. C. Van Dyck, 310 Pine.....	Jan 15
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The following brief abstract of the contents will give an idea of the branches of the subject treated: General Plan; Discussion of the Principles of Hydraulics; Rules Deduced from Formulas Obtained; Examples and Calculations; Extensive Tables for Ready Reference; Fundamental Laws of Hydraulics Demonstrated and Expressed in Formula and Rules; Flow of Water through Openings; Weir Coefficients; Triangular Weirs; Flow of Water over Quadrant Weir (tabulated); Application of Tables; Submerged Orifices; Flow through Orifices in Thin Partitions; Tables and Applications; Miners' Inches; Tables and Calculations; Flow of Water through Short Tubes and Compound Tubes; Flow of Water through Pipes; Tables of Velocities and Cubic Feet Flow for Given Fall per Mile and Diameter of Pipe; Coefficient for Bend—Circular and Angled; Flow through Nozzles; Inverted Siphons; Flow of Water in Open Channels; Extensive Tables; Rough and Ready Notes; Hints for Speedy and Approximate Estimates, etc.

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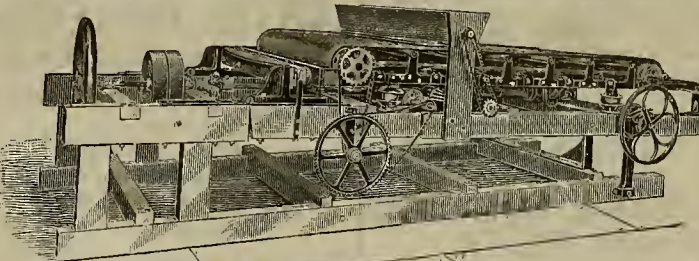
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VOLUME LXVIII.
Number 3

SAN FRANCISCO, SATURDAY, JANUARY 20, 1894.

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For the Safety of Miners.

One useful lesson was taught to mine-owners by the late fire at the Idaho-Maryland. Through long immunity from disaster, avenues of escape from mines, in case of accident, have been confined to the main shaft or tunnel. In cases where hoisting works are hurried, very serious consequences might ensue. Fortunately, at the Idaho-Maryland fire, the ventilation shaft, though long unused, was handy, and the ladders were substantial. Many mines are not so well provided. It may not be generally known, but there is a law in this State which requires all mining companies to maintain two shafts after a depth of 300 feet has been attained. Its purpose is to provide means of egress in case escape is shut off in one shaft or the other.

The experience of the Idaho-Maryland miners has awakened others to the lack of alternative shafts, and at the North Star mine, for instance, the Grass Valley Union says Superintendent Abadie has been very active connecting all the hose to the hydrants in case of an emergency. At the present time there is an excellent air shaft through the mine, but repairs are being made that will greatly insure the safety of the miners in case a conflagration similar to the Idaho-Maryland occurs. The air shaft is vertical for a distance of 125 feet and is furnished with wooden ladders. Mr. Abadie states that these are to be replaced by iron ladders which will not be subject to decay. The avenue of escape at the North Star will be made as perfect as experience and ingenuity can suggest, and in case of an accident there will be no cause for worry on the part of relatives or friends.

TRINITY COUNTY, which has heretofore done little to secure representation at the Midwinter Fair, does not propose to be left in the cold. An "Old Settlers" committee, consisting of J. McMurtry, F. M. Paulsen, Geo. E. Noonan and T. E. Jones, has taken the matter in hand and will collect an exhibit. It is designed to show specimens from every paying quartz mine, from placer mines, quarter of an ounce of natural dust, and also samples of copper, cinabar, asbestos, galena, magnetic iron, coal, or any other mineral which can be produced in the county. Besides these, there will be petrifications and relics of past ages.

A NEW SOCIETY is planned for the Northwest, modeled after the American Institute of Mining Engineers. It is estimated that the districts around Spokane contain at least 150 mining engineers, assayers, millmen and real experts who have technical knowledge of mining. It is to increase the knowledge and aid in sifting out the pretenders that the new society is to be formed. Besides the central society, which would hold annual or semi-annual

meetings, district circles would be organized at Helena, Vancouver and other centers. The idea is an excellent one, and it is to be hoped will be carried out successfully. There is no mining organization of any kind in the Pacific Northwest, so far as we know, and the new society would be able to promote the interests and knowledge of the district in substantial shape.

THE gold and silver used in the industrial arts is the subject of a careful calculation in the report of the director of the mint, as in previous reports of the mint bureau. The gold and silver furnished by private refineries during the calendar year 1892 was ascertained by



GREENSTONE OUTCROP ON THE MOTHER LODE.

correspondence with all the firms in the United States known to be engaged in the manufacture of gold and silver bars. The aggregate furnished by both private refineries and the government is given in the following table:

Material.	Gold.	Silver.	Total.
Domestic bullion	\$10,783,703	\$7,204,210	\$17,987,913
U. S. coin	787,334	5,152	792,486
Foreign bullion and coin	771,636	1,249,801	2,021,437
Old material	4,468,685	647,377	5,116,062
Total	\$16,816,408	\$9,106,540	\$25,922,948

There was no material variation in the amount of gold and silver used in the industrial arts during the calendar years 1891 and 1892, the value of gold in 1892 being \$16,616,408, against \$16,644,952 in 1891; of silver, \$9,106,540 (coining value) in 1892, as against \$9,631,746 in 1891. Data relating to the weight and value of bars furnished for use in industry during the fiscal year were received from the government institutions only.

GENERAL A. J. WARNER, President of the National Bimetallic League, has called a convention of the silver men of the country to be held at Des Moines, Iowa, February 22d and 23d. It will be a national convention and the call is issued by authority of the Bimetallic League, under instructions of the conference held last December in Washington.

A Greenstone Outcrop.

The illustration on this page shows a greenstone outcrop in Rancheria creek, Amador county. It is of interest to all miners to know that Dr. Stephen H. Emmens is making some extensive experiments in the greenstone at the Mayflower mine. Those who read his views on the Mother lode, printed in this paper December 30, learned that he took a positive stand against the generally accepted theory on the Mother lode, that development of greenstone veins does not pay. He cites instances where bonanza has been found in greenstone, and feels perfectly certain that he will have no reason to regret prospecting in greenstone in the Mayflower. The result of the Mayflower experiments will be duly given in the PRESS.

MR. CHAS. G. YALE, United States Mint Statistician, estimates that the gold yield of California for 1893 is between \$13,000,000 and \$14,000,000. Mr. Yale's estimate is certainly reasonable. It has been apparent, from the greater activity in gold mining, that the increase would be considerable over 1892, when the yield was \$12,571,000. The list of mines in actual operation was increased during the year. Numerous prospects were turned into mines and many idle mines were reopened. Several important mines have broken their best previous records. In 1892 the largest producer was the Kennedy, in Amador county, which gave up \$443,639.99. It is he-

lieved for 1893 that the greatest producer was the Utica, in Calaveras county, which is said during three months to have yielded \$498,000. The hydraulic mines, except on the Klamath, have as yet added little or nothing to the total output, but the increase will doubtless be considerable in 1894. The average for other minerals in California for 1893 was fairly kept up.

It is reported from Washington that the House Committee on Ways and Means will in all likelihood insert in the Wilson bill a provision taxing crude petroleum. Scrap iron will be on the free list. A determined effort will be made to restore the present duties on borax and quicksilver, with no very flattering prospects of success. California as a whole has perhaps more different important interests directly affected by the Wilson bill than any other State in the Union. California is practically the only State which produces quicksilver. California and Nevada alone produce borax. California is a leading producer of petroleum. With Oregon and Washington, it is practically the only producer of prunes. It is the only producer of raisins. Its fruit interests are widely concerned in other varieties. Its wine interests declare that the hill, if passed, will ruin them. The schedule on wool, lumber, harley and jute goods affects them,

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San Francisco, January 20, 1894.

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Valley Prejudice Lessening.

It seems a little curious to find so pronounced a valley paper as the Marysville Democrat opposing the proposition to send six delegates to Washington on behalf of river improvement. The Democrat claims that no benefit can result to Yuba county from their mission. But the recommendation of the Government Debris Commissioners for a \$30,000 appropriation to begin construction of a restraining dam at Deguerre point is strongly endorsed. Says the Marysville paper:

The Democrat is clearly of the opinion that this county in particular does not at this time desire a personal representation in the proposed delegation, unless it be to prevent a possible division of the appropriation recommended for the restraining works at Deguerre point. There is where the only danger appears in the proposition of sending men to Washington who are openly hostile to restraining dams, particularly those who have said that there is no merit in them in any place. We now have law and a commission to enforce it and carry out its provisions, and the Democrat has confidence in them and their judgment.

It is pretty well understood that the river improvement delegation will not oppose the appropriation for restraining dams or any other present measure in the interest of restraining dams. The fears of the Democrat are therefore groundless.

It is worthy of note also that the Sutter County Farmer has recently found room for a virtual endorsement of the Debris Commission. Commenting upon the recent action of the Commission in suspending operations temporarily on the Polar Star mine, at Dutch Flat, the Farmer says:

The prompt action of the present Debris Commission in suspending operations at the mine shows that it means business, and will give every mine that has a permit to run careful inspections from time to time. The valley people are expected to assert their rights by keeping thoroughly posted in regard to all these matters, and should not relinquish their careful watch over the vast interests they represent.

One more expression, this from the Colusa Sun, may serve to illustrate further the change of sentiment in the Sacramento valley regarding hydraulic mining:

We have tried not to be a crank on the subject of hydraulic mining. If the people who propose to mine on the tributaries of the Sacramento can take the debris out of the channels and deposit it, we shall be pleased to see them go ahead. No industry, however temporary its effects, shall receive a check at our hands if it does not conflict with interests more lasting.

The old valley prejudice seems to be dying out. It is now realized, perhaps for the first time, that the hydraulic miners desire to comply with a law that conserves the farmers' interests as well as their own.

ANOTHER valuable find out of the common is reported from Florence, Arizona, in the discovery of a ledge of fine black marble, valuable for interior furnishings and monumental work. Some of the marble brought in has been polished. It is handsome, very dark in color and beautifully veined. A body of good granite was also found near.

The New Mining Bill.

The executive committee of the State Miners Association, at its meeting last Friday, decided to urge upon Congress the desirability and justice of material amendment of the present mining laws; and, to that end, to present a substitute for the Stewart mining bill in the shape of the measure framed by a special committee of the association, comprising Messrs. Tiley L. Ford, Chas. G. Yale and Edward A. Balcher. The text of the proposed law was published in the MINING AND SCIENTIFIC PRESS November 12. It embraces the changes recommended by the Miners Association, includes the useful features of the Stewart bill and eliminates others that are obnoxious. It was practically decided to send to Washington one or perhaps two representatives of the association for the purpose of presenting its merits to Congress and urging its adoption. The delegation shall also assist as far as possible in securing passage of the association bill recommending an appropriation of \$1,030,000 for the purpose of constructing government impounding works to restrain mining debris.

The mission of the delegation is most important. It will endeavor to enlist the sympathy and active co-operation of Representatives in Congress from other mining states for the passage of the general bill. This measure was not framed especially in the interest of California, but the design was and is to make its provisions so useful, valuable and comprehensive as to commend themselves to all the mining states. An expression from other States will be solicited and any changes in the present measure that seem in the interest of all will be incorporated. It is therefore probable that the measure as finally presented to Congress will contain new provisions with, perhaps, changes in old. Of course those features particularly recommended by the miners of California will be retained.

The most important features of the bill—the keystone of the arch, so to speak—provide that the presence of rock in place bearing gold, silver, etc., shall be regarded as presumptive evidence that the land is, and always has been, mineral in character; likewise a provision defining how land shall be determined to be more valuable for mineral than agricultural purposes, and providing that this chapter shall be liberally construed by the land department. It is the purpose of these provisions to reverse the policy of the land department, which in its rulings requires that lands, even in mineral belts, shall be actually and severally shown to contain mineral before they shall be adjudged mineral. In other words, the presumption of the land department is that all lands are agricultural or timber until they are finally and conclusively shown to be mineral. In cases of contest between mineral and agricultural claimants the burden of proof is invariably imposed upon the miner, and agricultural claimants have, under this inequitable ruling, been permitted to alienate vast extents of land notoriously mineral from the public domain.

It will be observed, also, that the vexed question of mineral lands in railroad grants has been taken up in this measure, and a practical declaration made in favor of the mineral claimant as against the railroad company. It is well known in California that the Central Pacific company claims all lands within the boundaries of its grant not known to be mineral at the time of filing the map of location of the road. It is supported in its claim by a decision from United States Circuit Judge Sawyer. The provision that rock in place shall be presumed to be and always to have been mineral in character is an effort in the direction of equitable adjustment of the rights of mineral claimants on railroad lands. When Congress excepted mineral lands from the railroad grant, it clearly did not mean to except only that small fraction of the lands at that time known to be mineral.

Other changes in present laws have already been fully set forth in these columns. It will be as much the duty of the Miners' delegation to oppose the Stewart bill, if it is again presented to Congress, as to favor the measure they take with them. They will endeavor to point out its objectionable features to Congressmen and to Congressional committees, and there is good reason to believe they will be able to do effective work.

THE principles of hydraulics were applied with success, Wednesday, to the removal of a great mass of earth which covered the Southern Pacific railroad between Meta and Towles, Calif. Carpenters were sent to the scene, and a large sledge-box was constructed underneath. A stream of water was then turned on, and the mountain-side washed into the gully below. Before this operation was undertaken, however, the tall pines which came sliding down with the earth had to be removed. They had maintained their upright position during the slide. Locomo-

tives were placed on either side of the obstruction, and log chains leading from them fastened to the trunks of the pines. They were then drawn out of the landslide as a dentist draws teeth.

The Future of Borax.

By the Wilson tariff bill it is proposed to place crude borax and horacic acid on the free list, and impose on refined borax an *ad valorem* duty of 20 per cent. The present duty on boracic acid is 5 cents per pound, on crude horax 3 cents per pound, and refined borax 5 cents per pound. The reduction in tariff of the latter is more than one-half—about 65 per cent. The distinction made by the Wilson bill, in its treatment of borax in its various conditions, is not consistent with the general policy of the measure that raw material shall be admitted free and manufactured articles be subject to tariff duty. Refined borax is made to pay duty, and boracic acid comes in free.

No better illustration of the beneficial effect of the tariff on any given industry can be found than in the American history of horax production. Very little of the salt had been produced in this country prior to 1873. Then extensive beds of the borate of lime and soda were found in California and Southern Nevada. Though the material was not high-grade, preparation for its development was made. Foreign dealers and producers became alarmed at a prospective rival, and immense quantities of horate of lime were converted into boracic acid and shipped to New York, being admitted duty free. The effect was disastrous to the American companies. They struggled along for several years, but finally suspended operations altogether. They were unable to compete with the foreign product. Later some of the companies attempted to resume work, but they accomplished comparatively little until Congress came to their relief and placed duties on borax importations. Since then the industry has thrived, with some variations of prosperity and adversity, it is true; but these fluctuations were due as much as anything else to threatened tariff legislation. The failure of the great firm of Wm. T. Coleman & Co., in 1888, was ascribed directly to the tariff agitation, which caused the rupture of negotiations for the sale of their borax properties.

Before the discovery and development of the American horax deposits, the average price per pound of the refined product in New York was over 30 cents. It is now less than 7 cents. The companies are operating on a small margin of profit—if there is any profit. The most rigid economy is practiced in all departments. They are in no position to compete with the cheap foreign product; and removal of the product means, we believe, their material injury, if not their complete destruction. The industry is now one of no mean proportions, the production in 1892 reaching 14,243,099 pounds—greater than for any previous year.

It is difficult to see just what good will come out of the curtailment of the American output and the purchase of borax abroad. The foreign output is, it is asserted, practically under one management, at least so far as shipments to the United States are concerned; and the inevitable effect will be, we think, higher prices than at present prevail if the American competition is paralyzed. It is evident that the home consumers' interests have in the past been conserved by a tariff, inasmuch as the price has fallen steadily and persistently from 39 cents to 7½ in thirty years. The price for the refined product is now just a shade above the tariff. What good purpose will be served if all the restrictions are removed, and the United States draws on the salines of Asia Minor and South America for its supplies?

The welfare of the industry in California and Nevada involves the welfare of a large working force, consisting of laborers in the salines and the attached works, mechanics, woodchoppers, teamsters, etc. The farmers, haymakers and stockraisers in the vicinity of the borate fields would be deprived of a local market for their products—a consequence that would be most disastrous to them. Whole communities are seriously concerned in the matter, as its determination means a great deal for their prosperity.

It is all very well to point out the wide uses to which borax is put, and the resultant advantage to an immense number of industries if cheaper prices prevail. But the claim that cheaper prices will prevail has no sufficient basis; and we feel sure that cheaper prices mean idleness for capital invested in the American industry and the labor dependent upon it.

A NEW FURNACE, designed by Superintendent Rhodes and Metallurgist Klotz, has been added to the Arkansas Valley smelter, at Leadville. It is claimed that every ounce of silver will be saved, none being lost in the slag. The details of the furnace are kept a secret.

What a Buyer Wants to Know.

There are a great many going mines in California which may be bought for a fair price. There are many mines which are not for sale; and there some which are for sale but which will never attract a buyer until more reasonable terms are offered. As a rule, a buyer who knows his business is not willing to risk a large sum on a prospect. He wants a mine, and a hole in the ground is not a mine, though of course it may develop into one. But people in search of mines generally prefer one which has a body of ore in sight, having been developed to a greater or less extent. They want to reduce the chance of failure to a minimum, and, as a rule, they are willing to pay in proportion as additional certainty is secured. Many owners of partly developed claims realize the value of their mines, but they sometimes do not know exactly what a purchaser wants to know. They often think it sufficient to make a few general statements about their property, with the mill returns, when there are any, and the purchaser can find out for himself what he wants to know. Negotiations are often carried on partly by correspondence, and it is, in these instances, desirable that as full, complete, and accurate statements as to the properties be made as it is possible to make.

We have in view a good mine in one of the northern California counties, to which an Eastern man was attracted by favorable report. He examined the mine, and then he made memoranda of the following things which he desired to know and asked the owner to furnish:

1. Make exact map showing cross section and ground plan, giving length of tunnels, shafts, drifts, pay chutes in the workings, width and value of same, whether high or low grade.
2. Give full list of mill results, tons worked and bullion produced, with sworn certificates from mill man, if possible; also specify from what place in the mine such rock was taken; also state whether such rock was sorted, or if all between walls was milled; state character of ore, with principal bases.
3. What buildings, machinery, improvements and tools are now on and go with property.
4. Give profile of surrounding land, showing possible mill site; how water, if any, can be applied; how many inches, and at what head, and whether free or from company ditch; if so, at what price. Can water power be used all winter?
5. Give map of district, showing this mine in relation to others, and give short history of camp, showing production in years past.
6. Give statement as to roads, and access to mine, with distances. If no mill on property, what is distance to custom mill and cost of transportation?
7. Give prices of lumber, lagging, and mining timber and supplies.
8. What is estimated cost of working?
9. Give close measurements of ore stoped out and ore left in mine. Is country rock hard or soft? Give end-view of lode showing ore line and its relation to surrounding surface.
10. What is price of property and terms?
11. What is the nature of title and surface measurement, and extent of claim or claims?
12. What would be the best method of development?

These questions are numerous, but they are all important, and most of them are essential. There are other things in addition which may be stated in a report, and which will add to its value and clearness. Such a statement, embracing the particulars indicated above, can be made by any intelligent miner. It does not involve the employment of technical skill, except, perhaps, in the drawing of the maps. It can be done cheaply, and may lead to satisfactory results. A report on the above lines was largely instrumental in effecting a sale in the case cited above.

Precious Metals in 1893.

The annual statement of the Wells-Fargo Co. relative to precious metal production in the States and territories west of the Missouri river, published in this paper, is full of interest. Comparison with last year's figures will disclose the course of the various metals in a very satisfactory manner. For 1892 and 1893 the statements show:

	1892.	1893.	Decrease.	Increase.
Gold	\$30,119,636	\$34,202,891		\$4,083,055
Silver.....	50,607,601	38,491,521	\$12,116,080	
Copper.....	19,370,516	23,631,339	4,260,823	
Lead.....	11,433,947	7,756,040	3,677,907	
Totals.....	\$111,531,700	\$104,081,591	\$7,450,109	\$8,943,878

The exact effect of the partial suspension of operations in the silver mines is very clearly shown by the above figures. The falling off of silver production has been about 25 per cent; lead, 33 per cent. On the contrary, the production of gold has increased and so has copper. In-

deed, 1893 was the banner year for copper, no previous year having shown such great production.

The production of gold and silver combined in California for these two years is as follows:

	1892.	1893.	Increase.
Gold and silver.....	\$11,593,196	\$13,036,948	\$1,443,752

According to the Mint figures, the production of gold alone in California for 1892 was \$12,571,000. The difference in the estimates is sufficient to indicate that the production for California for 1893, according to the Government estimate, was over \$14,000,000.

Cost to See Midwinter Fair.

The following is printed as a complete list of the concessions at the Midwinter Fair to which extra admission is charged:

	Cen.
General admission.....	50
Hawaiian Cyclorama.....	50
Boone's Arena.....	25
Firth Wheel.....	25
Santa Barbara Sea Lions.....	25
Hawaiian Village.....	25
Dante's Inferno.....	25
Colorado Gold Mine.....	25
Chinese Building.....	25
Chinese Theater.....	25
Moorish Mirror Maze.....	25
Automatic Race Course.....	25
Green's Sculpture Exhibit.....	25
Egyptian Hall.....	25
Oriental Village (gate).....	10
Cairo Street (gate).....	10
Oriental Theater.....	25
Oriental Concert.....	25
Dancing Girls.....	25
Camel Trip.....	25
Donkey Trip.....	10
Haunted Swing.....	25
Heidelberg Castle.....	25
Heidelberg Concert Hall.....	25
Esquimaux Village.....	25
White Cloud Indians.....	25
Arizona Curiosities.....	25
Ostrich Farm.....	25
Forty-nine Mining Camp.....	25
Forty-nine Theater.....	25
Forty-nine Dance House.....	25
Foot's Museum.....	25
Electric Theater.....	25
Japanese Village.....	25
Roumanian Concert Hall.....	25
Captive Balloon Grounds.....	10
Balloon Trip.....	10
Scenic Railroad.....	10
Athletic Grounds.....	25
Mummy Exhibit.....	10
Merry-Go-Round.....	5
Phonograph.....	5
Total.....	\$10.00

"Popular Astronomy."

A new astronomical periodical, under the above title, has recently made its appearance, several numbers of which have already been issued, and the publication gives promise of filling a much needed want in periodical literature. It is designed more especially for amateur students and general readers. It will be issued monthly for \$2.50 per annum, except July and September—ten numbers of 50 pages each constituting a volume. It is "plainly worded, untechnical in language" and amply illustrated. Professors W. W. Payne and C. R. Willard, of Goodsell University, Northfield, Minnesota, are editors. The numbers before us are replete with articles of varied astronomical interest, devoid of technicalities, and so written that they may be readily comprehended by any intelligent reader. We notice among its contributors several prominent astronomers, among whom may be named S. W. Burnham, E. E. Barnard and James E. Keeler, well known in California.

In this connection it is pleasant to note that greatly increased attention is being paid to the science of astronomy, not only in our schools, but by the public at large as well. In many localities classes are being formed, after the manner of Browning, Shakespeare classes, etc., which are found to be much more interesting and profitable to the members. This kind of study is leading to the formation of many amateur astronomical societies, the rapid growth and usefulness of which have been pronounced phenomenal. This study and these associations, in some places, form an important part of the great University extension work which has recently become so popular and useful. The above publication will be found a most valuable aid in such work, and the publishers and editors have kindly volunteered their aid and advice in regard to the formation of such associations, the guidebook which would be most useful and the classification of the work and study which may be required.

The recent application of photography to astronomical work, together with photogravure, has rendered illustration so beautiful and perfect that the amateur can study the heavens almost as readily by such aid as by direct view through the telescope. A little insight into this beautiful study thus obtained almost invariably leads to either personal or associate ownership of the proper instruments, with which original study and research may be undertaken. A very small telescope with the camera oftentimes develops

matters of much scientific value. There is no study which, when once entered upon, so interests and enlarges the mind as that of astronomy.

Sliekens.

The Firth wheel made its initial trip at the Midwinter Fair grounds January 13th. Twenty-three hundred people were carried.

Dr. R. S. HAAVEY, an old pioneer in Washington and Idaho, well known to Conr d'Alene miners, recently died a Spokane from the effects of a fall.

The town of Mullan, Idaho, narrowly escaped being carried away in a snowslide last week. Several miners' cabins were crushed, and Cornelius McVey and John Lyon killed.

The production of the Delamar, Idaho, mines for December shows an increase over the average report. Manager Plummer shows a gross production of \$92,212, an estimated profit of \$52,547.

GARAT activity has recently marked the working of the Anacoda (Mont.) copper properties. It was recently estimated that by Jan. 15th 1800 men would be at work. Three weeks ago the total number was 300.

The Nance double-acting plunger Cornish pump was last week by error referred to as having been tested for a year at Grass Valley. The test was made at the Hontington Copper and Sulphur Company's mines, Wellington, near Magogg, Canada.

It is stated that there are now in the United States more than 300 mining companies making use in their operations of electricity for light and power. About one-third of the gross amount of copper refined in this country is now treated by electrolytic processes.

The Golden Star Mining Company has incorporated with a capital of \$100,000, of which \$10,000 has been actually subscribed. Principal place of business, San Francisco. Directors—James McCormick, William M. Pereira, F. P. Otis, George W. Grayson, A. M. Silverstein.

The Needles Reduction Works will soon be running once more. Messrs. Sheridan & Fairfield are simply awaiting the arrival of some heavy belting which had to be ordered from New York, and which will be here the coming week. As soon as it is received, the mill will be prepared to handle ores.

The directors of the Idaho Mining Company, Grass Valley, have declared dividend No. 279 of \$8 per share, aggregating \$18,600. They also voted to appropriate \$100 to the mineral exhibit of the Midwinter Fair. Fifty dollars of this goes toward the Nevada county exhibit and \$50 to the general State exhibit.

At the annual meeting of the Brunswick Con. Gold Mining Company the following officers were elected for the ensuing year: J. B. Robinson, president; J. J. Harpin, vice-president; T. H. Chandler, W. H. Philbrook, W. C. Wallace, directors; H. R. Lonsberry, general manager and treasurer; J. Stadfeldt, Jr., secretary; W. A. Hawley, superintendent.

The total product of the Kaslo-Slocan mines for the year 1893 in round numbers was 2462 tons that will average, at the present price of silver and lead, \$165 to the ton, or a total output of \$406,230 worth. The Kaslo-Slocan Examiner estimates that 5000 tons will be shipped from the Slocan country to the smelters of the United States during the present season.

A SMALL SENSATION has been sprung in the Northwest by the discovery that there is in file in Washington a petition favoring free lead ore, forwarded by the Conr d'Alene Miners' Union. It has been explained that the petition was gotten up last year during the Conr d'Alene troubles as a means of retaliation upon the mine-owners. Efforts are now being made to secure withdrawal of the petition.

At the annual meeting of the stockholders of the St. John Quartz Mining Company, Nevada county, the following were elected as a board of directors: D. E. Matteson, W. J. Michell, Lewis Wheeler, Wm. Treloar, John Aver, of Grass Valley; A. G. Huggins of San Jose; W. L. Thompson of Orland. The board organized by electing D. E. Matteson, president; W. J. Michell, vice-president; Lewis Wheeler, superintendent; J. M. Wiley, secretary.

The hotel at De Lamar, Idaho, burned recently, and the firemen, seeing the fight hopeless, devoted themselves to saving the office of the De Lamar Mining Company. Capt. De Lamar arrived on the scene and, noticing the firemen at work, roared in a voice of thunder: "To hell with the office! See that the poor families up the street do not lose their homes!" It is gratifying to know that the homes of the poor were saved, and that the office did not make the journey so unprofitably recommended by the captain.

"JIM" WARDNEA writes from Johannesburg, South Africa, to the Spokane Review: "I do not advise any man to come here who is not well equipped with experience and money. The country is full of Cornish miners and more coming. Nearly all the Australian miners have left that could go. But to the man—the American man—with \$5,000 to \$10,000, this is the place. Skilled men of many classes are in good demand, such as electricians, workers in wood and iron, carpenters and stonemasons. The wages are universally £1 sterling per day."

THERE is work enough on hand at the Tacoma smelter to keep the full force employed steadily till the 1st of February 1895. Manager W. R. Rust tells the Ledger that he has just closed a deal for the purchase of 7500 tons of gold ore from the Conster mine in Montana. The purchase price is \$400,000, of which \$30,000 is to be paid monthly. Manager Rust said also that the smelter is prospering, even during the general stagnation. Since the depression began it had paid off a debt of \$130,000, and was now entirely free from incumbrance. He proposes to put in next spring two more roasters, thus doubling the capacity of the plant.

Foundry Notes.

A GRIFFIN mill of 40 tons capacity is to be placed at the Mammoth mine, Arizona.

The offices of the California Wire Works have been removed to 509-511 Market street, San Francisco.

Mines and Mining in Nevada County.

From Our Regular Correspondent.

During the conflagration which occurred at the Idaho mine on Tuesday of last week, and while the smoke from the dying embers was slowly wafted skyward, men looked at each other askance and asked the question: What will be the result? Will they rebuild? These questions were repeated so loud and often that they echoed and re-echoed through my mind, and I even had the credulity to repeat to myself the question: Will they rebuild? The extreme absurdity of such a puerile question must be apparent to every one acquainted with the Idaho-Maryland property and its management. The fact that the Idaho has produced \$12,000,000 in gold bullion, one-half of which has been divided among the fortunate stockholders, and the further fact that since the transfer of the Idaho property to the Maryland company, which occurred less than nine months ago, over \$70,000 of the purchase price has been paid, should convince the most obtuse that work would be resumed immediately. It should be remembered by those unacquainted with the facts that the money paid to the Idaho company has been extracted from the Maryland mine through the Idaho workings. In face of these facts, does it not seem ridiculous to ask the question: Will they resume operations? The Maryland mine is great in extent and wealth. The compromise which was effected some months ago, after long and costly litigation, and through which the Maryland company became the possessors of the Idaho property, was accomplished with a view to promote the best interests of this community. And from present indications there is every reason to believe that the Maryland mine will be as rich and famous as its illustrious predecessor.

It is very gratifying to know that active operations have been resumed on this property, and that within a few weeks, every condition being favorable, the full complement of men will be employed. The throwing out of employment of 200 men, even though it be only temporary, must necessarily exercise a depressing influence in any community. The city is losing \$600 daily in wages alone, not mentioning the other multifarious expenses of such a large mine. But this will soon be regarded as past history by our residents, and we look forward to a bright and successful future for the Maryland mine.

In this misfortune Mr. S. P. Dorsey, president of the Maryland company, has the sympathy of the entire mining community of this county. Mr. Dorsey is a gentleman of great energy and enterprise, qualifications which make him a useful and valuable citizen. He has stood by the Maryland mine throughout its chequered career. All his wealth has been invested in the development of this property. Costly litigation almost impoverished him and prevented him from properly developing his property; and when his efforts and endurance were about to be crowned with success, when the consummation of his desires was almost accomplished, this disaster befell him. But Mr. Dorsey will succeed in spite of this serious impediment, and will yet become the possessor of great wealth.

The Idaho disaster has had one good effect—it has spurred the mine managers of the district to greater precaution in protecting the lives of their employees. They have also made extensive preparations for the protection of property in case of a similar conflagration. While the fire was raging at the Idaho mine, the greatest anxiety was manifested by the spectators regarding the safety of the miners. For a time there was some doubt as to the condition of the air shaft through which egress must be made in time of fire. But the men escaped through this avenue without accident of any kind. Every large and well-regulated mine, and smaller mines as well, should provide proper means of egress for those who labor in the subterranean depths. Delinquency in this respect should be punished by criminal proceedings. Only men of the most indifferent and dilatory character will disregard the interests of their employes in such a manner. I am pleased to state that greater precaution is being exercised by our mine managers, and that extensive preparations are being made to protect life and property in case of an emergency. Especially is this so at the North Star mine, where Superintendent Abadie has had hose connected to every hydrant. He is also making preparations to have the wooden ladders, with which the air shaft is now furnished, removed, and to replace them with iron ones. These will not be subject to decay like the wooden ones.

Last week an injunction was placed upon the Champion mine of Nevada City by the Wyoming company, and operations were immediately suspended. It is contended by the latter company that the Champion company have been making encroachments on their ground, hence the suit. The closing of the Champion mine in this manner will naturally affect the activity of Nevada City. This

mine is one of the largest and most prosperous in Nevada county, and the suspension of operations is greatly regretted. Litigation between mining companies is always costly and tedious, and it is to be hoped that this matter will be amicably adjusted without reaching the courts.

With the exception of the Idaho catastrophe, mining in this district pursues the even tenor of its way. The prospects for quartz mining were never brighter than at the present time. Increased interest is manifested by outside capitalists, and we predict for the year 1894 an era of unprecedented prosperity. We hope to see the rehabilitation of several abandoned mines whose wealth has never been questioned. There are millions of untold wealth lying hidden in these caverns, which only await the application of science and capital to extract it and permit it to circulate through the veins and arteries of the commercial world. These mines, with which our hills are dotted, have been abandoned because of the great expense incurred in developing them on account of the immense bodies of water encountered in the course of working. A large number of these undeveloped mines were abandoned in the early days, when the facilities for their development were not so great as they are to-day. As gold producers they possessed a national fame. They produced in the aggregate several millions of dollars, and there is every reason to suppose that when rehabilitated they will greatly add to our present production. There are plenty of precedents for this conjecture. Every one of our deep mines, with the exception of the Idaho, has at some time in its history been abandoned for the same causes which have led to the abandonment of the mines which to-day lie idle and undeveloped in this county.

Several carloads of gold-bearing quartz have been sent to the Midwinter Exposition from this county for use in the mill erected on the grounds. Nevada county is the Nestor of quartz mining. And we propose to show the visitors to the Fair that we have the richest gold-bearing ledges in the world. The mineral thus sent has been impartially selected by the managers of the different mines. No attempt has been made to create a false impression regarding the richness and extent of our mines. We are content to have the visitors judge the greatness of our mines upon their merits alone.

Great benefit must necessarily accrue to this county through the medium of having the quality of our ores tested by such process. I understand that when a "clean-up" is made the result will be duly announced, with the name of the mine from which the ore was extracted, the amount of ore crushed, the total yield per ton, etc. I hope this method will be adopted and strictly adhered to.

The managers of the Electric mine, formerly known as the Green Mountain, have purchased a mill and will shortly transport it to their property. The mill consists of 20 stamps, with concentrators and all the appurtenances of a first-class mill. It is pleasing to note the rapid developments that are occurring at this mine. Some months ago it was reopened by Mr. Dan Coffin, who is the principal owner, and under his management rapid progress has been made in development. Several crushings have been extracted that have yielded immensely; in fact, so productive in gold is the quartz in this mine that the results of the crushing have always been kept a secret. We regard the Electric as one of our future gold-producers.

Operations at the Hudson Bay mine have been resumed, after having been suspended for some months. Superintendent Tregidgo asserts that the mine will be developed as rapidly as circumstances will permit. He has been rather unfortunate with this mine, having had to suspend work on several different occasions. But we hope that as soon as the shaft is relieved of its water, work will be continued without interruption and the mine will quickly become a regular dividend-payer. The mine is in a good locality, adjoining the famous new Rocky Bar mine, and has a course on the vein of 1600 feet. The manager, Alf Tregidgo, is one of the best known mining men in California. He is an indefatigable prospector, full of energy and enterprise, and is greatly deserving of success. He has invested much capital in the mines of this county, and it is the unanimous wish of all that his enterprise will be crowned with success.

Last week the Debris Commissioners, in company with State Commissioner Kidder, visited the Hustler, Kate Hayes and Manzanita mines on the San Juan ridge. The object of their visit was to inspect some of the mines which had made application for a license to resume operations under the Caminetti Act. We could not learn the conclusions arrived at by the Commissioners as a result of their visit, but we are convinced that for every application made a license will be granted, after all the requirements of the law have been complied with. SAMUEL BUTLER, JR.

Grass Valley, Jan 17, 1894.

Precious Metals in 1893.

The annual report of John J. Valentine, president of Wells, Fargo & Co., shows that precious metals produced in 1893 in the States and Territories west of the Missouri river (including British Columbia) were as follows: Gold, \$34,202,601; silver, \$38,491,521; copper, \$23,631,339; lead, \$7,756,040; total gross result, \$104,081,591. The "commercial" value at which the several metals named herein have been estimated is: Silver, 74 cents per oz.; copper, 10 cents per lb., and lead, \$3.50 per cwt.

Mr. Valentine says by way of explanation: "As in former reports allowance must be made for probable variations from exact figures, by reason of constantly increasing facilities for transporting bullion, ores and base metals from the mines outside of the express and the difficulty of getting entirely reliable data from private sources. Estimates obtained in this way are liable to be exaggerated and are, to a considerable degree, guess work; but with some modifications on this account, made herein, the general results reached, while only approximately correct, may be accepted as the closest approximation possible under the circumstances."

STATES AND TERRITORIES.	Gold Dust & Bullion by Express.	Gold Dust & Bullion by other Conveyances.	Silver Bullion by Express.	Ores & Base Bullion by Freight.	Total.
California	\$ 9,697,036	\$1,475,000	\$ 557,005	\$1,667,907	\$13,096,048
Nevada	1,413,633	.....	1,236,869	847,570	3,508,051
Oregon	1,076,977	75,000	111,662	.....	1,263,639
Washington	249,553	25,000	123,352	.....	403,405
Alaska	.....	918,246	.....	.....	918,246
Idaho	1,645,000	.....	1,481,973	904,167	4,031,140
Montana	3,100,500	.....	10,730,000	18,550,000	32,380,500
Utah	377,352	.....	1,041,115	7,518,307	8,936,864
Colorado	7,229,648	.....	16,869,257	3,878,635	27,477,535
New Mexico	302,541	125,000	207,857	977,487	1,612,885
Arizona	1,082,348	225,000	224,740	5,353,293	7,300,410
Dakota	2,283,000	.....	200,000	15,000	2,498,000
Texas	.....	.....	315,000	.....	315,000
Br. Columbia	253,968	.....	.....	.....	253,968
Totals	\$23,716,521	\$2,843,246	\$32,343,591	\$40,217,465	\$104,081,591

The gross yield for 1893, shown above, segregated, is approximately as follows:

Gold	32.86	\$34,202,601
Silver	38.93	\$38,491,521
Copper	22.71	\$23,631,339
Lead	7.45	\$7,756,040
Total	.....	\$104,081,591

ANNUAL PRODUCTS OF LEAD, COPPER, SILVER AND GOLD IN THE STATES AND TERRITORIES WEST OF THE MISSOURI RIVER, 1875-1893.

YEAR.	Production as per W. F. & Co.'s statements, including amounts from British Columbia and west coast of Mexico.	Product after deducting amounts from British Columbia and west coast of Mexico.
1875	\$80,888,057	\$76,703,433
1876	90,875,173	87,219,350
1877	98,421,754	95,811,582
1878	115,154,622	112,726,167
1879	75,949,501	72,683,883
1880	80,167,998	77,232,512
1881	94,504,417	91,108,474
1882	92,411,835	89,207,540
1883	90,313,612	84,639,212
1884	84,976,054	81,633,335
1885	90,131,260	87,311,382
1886	103,011,761	100,160,222
1887	104,645,959	103,327,770
1888	114,341,592	112,066,569
1889	127,677,836	126,728,384
1890	127,176,410	126,504,382
1891	118,237,441	117,946,565
1892	111,531,700	111,250,508
1893	104,081,591	103,827,622

The net products of the States and Territories west of the Missouri river, exclusive of British Columbia and west coast of Mexico, divided, are as follows:

YEAR.	LEAD.	COPPER.	SILVER.	GOLD.
1875	\$ 5,100,000	.....	\$31,635,259	\$39,968,194
1876	5,040,000	.....	39,292,924	42,386,935
1877	5,085,250	.....	45,946,102	44,880,223
1878	3,452,000	.....	37,243,137	37,576,030
1879	4,185,769	.....	37,092,857	31,470,082
1880	5,742,390	\$898,000	33,033,055	32,550,067
1881	6,361,902	1,105,000	42,987,613	30,653,969
1882	8,008,155	4,055,037	43,133,020	20,011,813
1883	3,163,550	6,683,921	42,075,101	27,816,460
1884	6,334,091	6,036,252	43,520,025	25,133,587
1885	5,502,981	7,539,036	44,516,590	26,393,756
1886	9,185,193	0,276,758	42,136,351	29,501,424
1887	9,631,073	10,362,740	50,833,834	32,500,087
1888	11,263,630	18,261,490	53,152,747	29,987,702
1889	14,603,323	14,703,763	64,808,637	32,527,681
1890	11,509,571	20,569,092	62,930,831	31,795,361
1891	12,335,730	13,261,663	60,614,004	31,635,113
1892	11,433,947	19,870,518	50,607,801	29,347,444
1893	7,756,040	23,631,339	38,491,521	33,948,723

The exports of silver during the past year to Japan, China, the Straits, etc., have been as follows: From London, \$55,973,825; from San Francisco, \$11,741,660. Total, \$67,715,485, as against \$67,342,524 last year. Pounds sterling estimated at \$4.84.

United States of Mexico.

STATEMENT OF THE PRODUCT OF GOLD AND SILVER IN THE REPUBLIC OF MEXICO, REVISED AND CORRECTED FROM 1877 TO 1893. VALUES UPON MINTAGE BASIS.

YEARS.	GOLD.	SILVER.	TOTAL.
1877-1878	\$ 747,000	\$24,837,000	\$25,584,000
1879-1879	831,000	25,125,000	26,006,000
1879-1880	842,000	26,500,000	27,342,000
1880-1881	1,023,000	26,274,000	27,297,000
1881-1882	957,000	29,320,000	30,266,000
1882-1883	958,000	29,569,000	30,526,000
1883-1884	1,055,000	31,695,000	32,750,000
1884-1885	914,000	33,226,000	34,140,000
1885-1886	1,028,000	34,112,000	35,138,000
1886-1887	1,047,000	34,600,000	35,647,000
1887-1888	1,031,000	34,912,000	35,943,000
1888-1889	1,040,000	40,705,000	41,745,000
1889-1890	1,100,000	41,500,000	42,600,000
1890-1891	1,150,000	43,000,000	44,150,000
1891-1892	1,275,000	45,750,000	47,025,000
1892-1893	1,400,000	49,500,000	49,900,000
Total	\$16,514,000	\$552,895,000	\$569,409,000

Hydraulic Mining.*

A REVIEW OF THE INDUSTRY BY DR. HENRY DEGROOT.

In Eight Parts—Part IV.

Dams and Reservoirs.—For arresting and diverting the water of the supplying stream into the ditch, a dam of some kind will be required. As the mountain rivers and streams of California are torrential and subject to violent floods, these structures need to be solidly built. They are usually of two kinds, one being constructed of round or hewn logs so placed across each other as to form a series of cribs from eight to ten feet square, these logs being notched so as to lock into each other and fastened together with wooden pins, or, better, with iron bolts, the bottom timbers being bolted to the bedrock.

As the dam is built up these cribs are filled with rock. To render it tight the face of the dam is planked, the seams between the planks being fattened or calked. A cheaper and more common style of dam is made by felling large pine trees across the stream and then placing the butts of other and smaller trees on these with tops up stream. This

California, and the consequent low stage of water in the larger streams, some of which fail altogether, the storage of enough water to enable the hydraulic miner to continue or much prolong his operations during this, the most favorable season for the same, becomes to him a matter of paramount importance; hence the construction of the many large reservoirs found in the mountains of California, formerly drawn upon to supply the hydraulic ditches when the running streams failed.

Hardly anywhere else in the world can be found such costly and capacious reservoirs as these in the region above indicated, although similar structures, designed to fill the irrigating ditches, are now being built in other parts of the State, some of which, as regards cost and holding capacity, rival the great water repositories cradled in the basins high on the western slopes of the Sierra Nevadas.

These stupendous works were projected and built at a time when the hydraulic miners had reason to believe that they would be permitted to carry on their operations without interruption—at a time when the people and the public authorities of this State were applauding the enterprise of

same formation as the bedrock—the floor of the channel. Not in all hydraulic deposits, nor perhaps in a majority of them the world over, does the bedrock tunnel become a necessity. In California these adits are not much needed except along the central portions of the main gold belts, the sites of the dead rivers or ancient pliocene channels. Elsewhere in the State these deposits occupy, for the most part, the channels of more recent streams, being the former beds of the present rivers, which, on becoming filled up, were deflected from their courses. Owing to frequent shiftings, or other causes, nowhere have these streams eroded the deep, rocky troughs characteristic of the dead rivers. The extreme richness of the latter, many portions of which contain enough gold to warrant their being exploited by the drift method, more than compensates for the additional cost necessitated by the driving of these tunnels.

Where a tunnel of this kind requires to be run, a shaft should first be put down to bedrock in order to determine the level on which it is to be carried. In, otherwise there is danger of its being too high, thereby defeating the end it



MIDWINTER FAIR—MAIN ENTRANCE AGRICULTURAL BUILDING. (From Photograph Taken, Dec. 10, 1893.)

done, another layer of trees is placed on at right angles to the last, this process being continued till the structure is raised to the proper height. Each layer of trees as put down is covered with rock, gravel and brush, forming a mass not easily affected by the greatest floods.

Hardly ever are dams of masonry or framed timbers built for filling these ditches, as these other and cheaper structures generally answer every purpose. Sometimes nothing more than large boulders are thrown into the stream, these serving to divert enough water to fill the miner's ditch.

For regulating the admission of water into the ditch a gate must be placed at its head, the drop in the gate being raised and lowered by means of a lever or screw. Where practicable it is well to have the upper part of the ditch, for a few yards at least, cut in solid rock, as affording greater security to the gate and the ditch itself against floods.

Owing to the occurrence of the long, dry summers in

the builders and encouraging them to make these heavy expenditures.

That this outlay should have proved disappointing and fruitless was not the fault of the men by whom it was made; and although these works, now practically wrested from the owners, may not be permitted to subserve their original purpose, they will not always remain as at present, profitless and useless. They will, in the hereafter, be made to promote other industries and interests, to the advantage of parties other than those to whose energy and trust they are indebted for their existence; but, even then, their founders remaining despoiled and unrewarded, these works will stand forever on the mountains overlooking all California, a monument of our engineering—a reminder of a flagrant judicial wrong and a great national injustice. Having been so eliminated from the business of hydraulic mining, no detailed description of these once important adjuncts of that industry need be given in this paper.†

Bedrock Tunnels.—The bedrock tunnel, so called, is an adit driven to reach and open up the gold-bearing gravel deposit where this rests in a channel having rocky sides, the latter termed often the "rim-rock," it consisting of the

is designed to subserve. If the tunnel on reaching its objective point is found to be too low, a shaft must be raised connecting its inner extremity with the washing pit. Through this shaft the water and gravel is dropped into the tunnel, and by it transmitted to the sluice set below its mouth, the tunnel itself usually being paved throughout its entire length with cobbles or wooden blocks. As these tunnels are so little needed outside of the enjoin districts of California, now idle and in which but few additional structures of this kind will ever be required, a more minute account of them is hardly necessary here. Their character as regards size, grade, etc., will naturally suggest itself to the builders, the rule being to adapt the size of the tunnel to the work to be done, and give it all the grade there is to spare. Frequently it happens, even in these pliocene formations, that large bodies of gravel stand above the rim-rock. Where such is the case, washing may be commenced and carried on for a long period, the construction of the bedrock tunnel being meantime delayed.

ONE more life has been lost in the search for the fabled Pegleg mine, on the Colorado desert. S. W. Pratt, a San Francisco millwright, who has devoted much time to the search, has not been heard from for many months, and has undoubtedly perished. There is no reasonable doubt that

*This article was prepared by the late Dr. De Groot for the Eleventh Report of the State Mineralogist, just issued; but its publication with that of much other valuable matter was prevented by the necessity of revision and omission, so that the volume might be reduced to reasonable limits. It covers familiar ground, but is, on the whole, a complete and careful review of the industry and hydraulic-mining methods. The article has been furnished this paper by State Mineralogist J. J. Crawford.

†It may be well to say that these works now bid fair to be used again to a considerable extent in hydraulic mining. Many of them also supply water for power in quartz mines.

the Pegleg is a myth, and that the hunt for it will always be useless. Last year ex-Sheriff Aguirre, of Los Angeles, and a party of three, after incredible hardship, found the land-marks indicated by old Pegleg, and hunted faithfully for some days for the ledge or the nuggets which Pegleg declared abounded there. They consider it impossible that the gold could have escaped their search, and returned convinced that Pegleg was a dreamer—or, as they somewhat inelegantly expressed it, “a blamed old liar.” The experience of this party, which reached the locality, and of others which have perished, ought to deter others from the useless quest.

A New Mineral.

The Australian Broken Hill Consols mine is well known as yielding a greater variety of ores than any other mine on the barrier, says the Broken Hill (Australia) *Age*. To give a complete list of what has there been unearthed would require more space in these columns than we have to spare. Not long ago we drew attention to the fact that sternbergite had been met with—a mineral that is rare all the world over—and which, as far as we can ascertain, has not before been met with in Australia. The one to which attention is now directed is new to science, and at the suggestion of Mr. Pittman, the Government geologist, has been named “willyamite.” It contains antimony, cobalt, nickel and sulphur, and traces of iron, copper and lead. Its discovery is due to the great interest taken by Mr. George Smith, of the Consols mine, in all matters relating to mineralogy. It is not necessary at this time to say more than this, because Mr. Smith's ability in determining minerals is known in many places outside of Broken Hill. After determining the mineral, Mr. Smith sent a description and samples of it to Mr. Pittman, and that gentleman very kindly undertook to bring the discovery before the Royal Society of New South Wales. To this end he prepared and read a paper before the society last week.

A remarkable feature in connection with willyamite is that it was found in one small patch only associated with a one-half cwt. lump of dyscrasite (antimonial silver); and, although several lumps of the latter were found in close proximity, only one contained the new mineral. Strangely enough, a similar piece of dyscrasite from the same locality was found to contain the rare mineral sternbergite, and it was only with this one piece of silver that sternbergite has been discovered in the mine, an interesting coincidence, seeing that both these lumps of silver were so closely connected *in situ*. Complete analyses have been made by the Mines Department, and the composition was found to be as follows: Antimony, 56.71; cobalt, 13.84; nickel, 13.44; iron, trace; copper, minute trace; lead, trace; sulphur, 15.92; total, 99.91, agreeing very closely to the formula $\text{Co}_2\text{S}_2, \text{Ni}_2\text{S}_2, \text{CoSb}_2, \text{NiSb}_2$. Willyamite crystallizes in the isometric system, possessing the perfect cubical cleavage characteristic of analogous minerals; its specific gravity was found to be 6.8 and hardness about .5. Cobalt has been for some years of common occurrence at the Consols mine in the minerals cobaltite and erytherite, but to the best of our knowledge the discovery of nickel has not hitherto been made at Broken Hill. This is the second occasion, at least, on which Broken Hill has given a new mineral to science, *i. e.*, marshite and willyamite. The fact says much for the ability of the discoverers, and Australia should be proud of them.

Free Lumber.

The Puget Sound *Lumberman* says: “How free lumber will effect the Pacific Coast can be easily figured out. The capital invested in the lumber industry in Washington, Oregon and California is not far from \$50,000,000; nearly 27,000 are paid in wages \$18,000,000 annually. Washington and Oregon last year produced 1,700,000,000 feet of lumber. Of this amount 350,000,000 feet were shipped to California and about 300,000,000 feet were shipped to foreign ports and the East. At the same time nearly 2,000,000,000 shingles were cut in the two States, over one-half of which found markets in the Eastern States. The industry brought into the two States about \$12,000,000 last year, and is consequently the mainstay of the Pacific Northwest. This trade is threatened by British Columbia and Canada in the event of the Wilson bill becoming a law. Lumber carried from Washington and Oregon to any port within the United States must be carried in American bottoms. This places the Washington and Oregon lumbermen at a disadvantage in case of competition with British Columbia, and the California market, which takes fully one-half of the exports of lumber from Washington and Oregon, will practically be given over to British Columbia if the Wilson bill becomes a law. In the Eastern markets the influx of Canadian lumber can be depended on to retard the introduction of Washington and Oregon lumber, and the shingle industry will suffer also from the same cause.”

A Decision in Water Rights.

The State Supreme Court, in bank, has handed down a decision in the case of the Natoma Water and Mining Company, respondent, *vs.* Hancock *et al.*, appellants, on appeal from Sacramento county.

In an opinion written by Chief Justice Beatty, and concurred in by Justices Harrison and Fitzgerald, the judgment and order of the Superior Court are reversed and the cause remanded for a new trial. Justice McFarland dissented *in toto*, and adhered to his former opinion in Department. In a separate opinion, Justices Patterson and Garoutte concurred in the reversal of the judgment. Justice DeHaven rendered an opinion, dissenting from the judgment.

The case decided was an action to enjoin the appellants from diverting water from the South Fork of the American river, at a point immediately above the dam of the respondent, and the principal question involved in the case is as follows: If a prior appropriator of water constructs a dam across the bed of a stream for the purpose of raising its surface at a level which will cause it to flow into his ditch, does he thereby acquire such an exclusive right in the bed and banks of the stream, as far as the slack water extends above his dam, that he can enjoin a subsequent appropriator of the surplus from tapping the stream and diverting such surplus at any point above the dam and below the head of the slack water?

The decree of the Superior Court, from which the defendants appealed, cannot be sustained without affirming this proposition. The plaintiff has at all times diverted water to the full capacity of its canal, and applied the whole of it to beneficial uses, for mining and irrigation. It still requires for irrigation and other useful purposes all the water so diverted, and as against a subsequent appropriation has an undoubted right to continue such diversion unmolested and undisturbed, except in so far as a lawful appropriation and diversion of the surplus at a point above its works may involve the necessity of altering and perfecting the appliances which have thus far proved sufficient to fill its ditch.

If, when on re-trial of the cause the rights of the parties under the contract are again submitted for decision and regulation, the Court should find the extent to which the plaintiff's canal was enlarged in 1862, and, precisely and definitely, the dimensions and setting of the box which the defendants and their predecessors put in and used, in pursuance of plaintiff's grant.

Rough Experiences in Australia.

The great drawback in the new Coolgardie fields in Australia is lack of water. The sufferings of a party are thus described in an Australian paper:

Some ten weeks ago a Mr. Besant, of Newcastle (N. S. W.), with his son Walter, a man about 30 years of age, proceeded to West Australia with the object of getting work at Coolgardie. Leaving Perth, the men unfortunately took the wrong route; but after meeting with many hardships reached the field and took up a claim in conjunction with several other miners. They found a good deal of the precious metal, but discovered that water was terribly scarce. The gold was so very fine that a supply of water was found to be absolutely necessary for its treatment, and their venture was, therefore, only partially successful. Mr. Besant went to work in Bayley's Reward claim, and the young man, with 17 others, struck out for a new diggings 90 miles distant. In a letter to his mother Walter Besant gives a graphic account of the sufferings which befel the party. They took, he says, as much water as could be conveniently carried, but the supply was far too small for their journey. To add to the horrors of their situation they lost their way in the wilds they had to traverse, and were reduced to such a condition that the daily allowance of water was only two teaspoonfuls per man. The pangs of thirst became intense, and the ordeal was made the more terrible by the great heat. In this dire extremity young Besant determined to return to Coolgardie for assistance, and commenced his solitary journey without delay. He had to travel a distance of 130 miles through an almost trackless waste and in a very exhausted condition. Before reaching the end of his journey he met a party of miners also bound to the gold field. He explained the condition in which he had left his companions, and begged the strangers to return to their assistance. His request was refused, however, and he was compelled to plod on to his destination. Upon arriving at Coolgardie he related his sad story, and measures for supplying relief were instantly adopted. Camels, provisions and water were procured, and he acted as guide to the succoring band. The other members of the party were eventually reached, and were found to be in a frightful state. Two men were lying dead, and five others were on the verge of insanity from the effects of their awful sufferings. Some of the men had

torn off their clothing in their delirium, and were perfectly naked, and others were at their last gasp. The survivors were brought round gradually, and were then conveyed to Coolgardie. Young Besant is still at Coolgardie, and states that it is the richest field he has ever seen, but has a great drawback in the scarcity of water.

Gravel Channels of Plumas County.

Abridged from Article by E. C. H. in Plumas *National Bulletin*.

Gravel mining in this county is comparatively an undeveloped industry. The same may be said of quartz. While it is true that gravel has been worked since the earliest days, yet when the vast group of ancient river-beds, a majority of which are still undisturbed, are considered, it is at once apparent that this special branch of mining is as yet scarcely begun.

For the practical miner, or the capitalist, who may invest a portion of his wealth in opening these channels, it is sufficient to know that they exist, and where developed the investment will yield many fold. The old channel system, especially in this vicinity, is an extensive one. Within a radius of a dozen miles fully that number of clearly defined channels are found. A few are intact for many miles in extent. Others are more or less broken from convulsions and erosions. Those lying low have, in the past, been worked extensively by hydraulicking and yielded vast amounts of gold. It is hoped that they will be worked to the fullest capacity in the future. The larger and more extensive channels, which are generally situated on the higher elevations, ridges and divides, seem the more favored locations, and being higher than the surrounding country, and with precipitous sides, afford excellent sites for tunnels. It seems to the observing mind strange that, with all the natural advantages at hand that man could reasonably wish, these river-beds have not long since been explored; but they have not, and no one, not even the privileged citizen with whom the country is burdened, can say there are no mines in these channels, for as yet not one of them has been opened, all owing to the fact that the resources of Plumas are unknown outside its limits. A few attempts have been made by so-called rich companies, both foreign and Eastern, but with disastrous results. These companies were formed in the East and in foreign countries, of Eastern and foreign capitalists, headed by adventurers with far more cheek than practical knowledge. A corps of officers, Eastern or foreign, were also sent, whose combined knowledge of mines, when simmered down, would not equal that of a Chinaman, and the number of officers sometimes outnumbered the working men.

Thus the money was squandered, while development work remained a secondary consideration. It requires only a limited number of men to run a tunnel, with a practical miner as foreman. If the money that has been thrown away by adventurous persons and that paid to high salaried officers had been judiciously spent, many paying mines would be in operation here to-day. The advent of such a company in a mining section is generally hailed with delight by the people, because times are made better, but it were far better for the section if such companies had stayed away, for when the reaction comes, as it invariably does, times are left in far worse condition than before; besides, the country gets what is called a “black eye”—a set-back from which it takes a long time to recover.

There is plenty of room for legitimate enterprise in Plumas county. I honestly believe and assert, that no county in the State can offer as promising a field for capitalists and prospectors, for lucrative investments. The surface “diggings” have yielded immensely. The sources from which spring this yield lie invitingly open, awaiting intelligence, energy and capital to bring forth their hidden treasures. It is often stated that the county is unprospected. This is a literal fact. Every rich surface deposit has its feeder. These feeders remain, the most of them, undiscovered.

What the country needs greatly is a small army of prospectors that know how to trace a lead. Such men will find fine opportunities in this section. Our mineral exhibit has undoubtedly awakened widespread interest in the county. We hear and see evidence of it every day, and the longer the exhibit is kept before the public, the greater will be the benefits.

The coming season is going to be the liveliest that the county has seen for many years. Already several large enterprises have been started, and many thousands of dollars have been circulated in our midst. The enterprises spoken of are strictly legitimate, and here to stay. When such well-known and successful miners as James O'Brien and O. B. Campbell pass judgment on the mines of Plumas and call them good, and back their judgment by buying the largest hydraulic mines in the county, it is a great recommendation. And these men have taken millions from the mines of Yuba and Nevada counties, where the largest mines of the State are situated.

Why the Golden Feather Brought No Returns.

The fourth ordinary stockholders' meeting of the Golden Feather Channel Co. (Ltd.) was held in London, December 21, 1893. The chairman, J. T. P. Pechey, presided. In addressing the stockholders, he said: "Gentlemen, I am quite sure you have all read and very carefully considered the report and accounts, which, on behalf of your directors, I now ask you to adopt. You have also studied the report of our general manager, Col. McLaughlin, and you have been able to form a pretty accurate conclusion as to the reasons which have prevented our obtaining returns during the season which has just closed. If this be so, I am sure that you cannot have failed to understand that the failure to obtain returns this season is due to circumstances over which there could be no possible control. [Hear, hear.] All the same it has been a very great disappointment to us—perhaps to the directors even more than to you—because, gentlemen, we have not only all the responsibility and all the anxiety on our shoulders, but we have also to stand the brunt of the continuous fire of criticism—generally childish and all of it spiteful—which has been assailing this company from its inception. [Hear, hear.] But though we are disappointed, I am glad to say that we are not in the slightest degree discouraged. [Hear, hear.] We have a most arduous task in this company—to fight a continuous battle against all forces of nature. As we tell you in our report, all the natural difficulties of working a river-bed in a mountainous district constitute the chiefly speculative character of this enterprise. Now, let me go back to the cause which has prevented our getting returns this season, and I must ask you to carry your memories back to the big storm of November, 1892. That storm raised the Feather river to a higher point than had ever been known for 13 years. The Feather river in 48 hours was raised 40 or 50 feet above its natural level, and, instead of running along a width of 100 feet it spread itself over half a mile. You can well understand that although our head dam and our canal and permanent works passed through the ordeal almost without injury, yet, still, all the "running tackle" was carried away. The river came down in such tremendous force that the debris filled up the ground which had been opened out last year, 400 feet, which was worked out during the season 1892. That would not have mattered if the timbers had not come down with such force that they broke up the lower part of the elevator. Consequently, when the debris came down and filled up this pit, and when work had to be recommenced at the beginning of this year, instead of our manager being able to turn on the water and at once deal with the debris, he had to sink through an enormous mass of debris and broken timbers until he could reach the elevator and set it going. There are just three points which have delayed us this year—first, the delay which was caused by the very late season, in consequence of which we did not get to work for something like five weeks later than last year; then there was the breaking up of the elevator, and having to sink through all this mass of debris and timber before it could be set to work; and, lastly, there was a mass of debris in the pit which had to be cleared before the manager could attempt to do the work he was preparing to do before the storm burst—that was the construction of a new and perfectly tight foot dam. He had been very much handicapped by not having a proper foot dam. The one we have been working with hitherto was not fixed with its foundations in the bedrock, but simply on the debris which overlay that bedrock; consequently the moment the claim was pumped out and the pressure of the water came from the river there was continuous seepage going on, and that seepage took nearly half the power of the elevators to contend with. I am glad to think that that will not be so in the future. Now, all this does not in the least affect the value of the mine. We know by our experience of the last two seasons that we can get to the bottom of this river, and that in favorable seasons we can work to the bedrock, and we also have been told from time to time that there is gold in the bottom of this river-bed. Perhaps you are almost tired of hearing that story, but we have such positive evidence on the subject that any business man carefully weighing it cannot come to any other conclusion than that we have in front of us a very rich deposit of gravel indeed. First, there are the old records still existing in Oroville, which tell us of the large amount taken out of the Cape Union claim in the early days. Then we have the testimony of those men who worked on the Cape and Cape Union claims, in futile attempts to sink and dredge out the gravel by means of iron pipes and all sorts of appliances. I happen to have received a call the other day from a gentleman who was in Oroville, interested in this suction effort at the time the trial was made. His evidence only goes to corroborate what we have told you—that there is an enormous amount of very rich gravel left by the Cape Union claim-owners when driven out of the early workings. If that is not suffi-

cient evidence, then we have the evidence of Mr. Borwick and Mr. Kirkpatrick and others who have seen the property. We know what Mr. Borwick washed out a few hundred feet ahead of the elevator, and with that evidence before us our faith remains unchanged. It is simply overwhelming as to the results we may look forward to obtain when we can once get to work upon this gravel lying before us. I am not one to come and tell you this if I thought there were any likelihood of this effort being a failure. I do not believe in throwing good money after bad, and if we had worked out 2000 or 3000 feet of the 8000 feet of river-bed that we own, and had then found that the gold was not there, I should say to you at once, "throw up the sponge," but it is nothing of the kind. We have worked only 400 feet, and that in a portion of the river-bed where we now know it was impossible to find returns. We have been terribly handicapped by the lateness of the season and various other causes, but I am thankful to think that we do stand in a different position to-day as regards next season—in a better position than ever before. [Cheers.] We are determined, as long as we believe in this thing, to carry it through, and you are going to help us. Pardon a little digression.

"When I was in California there was a great gold excitement that took place in a part of the United States called Pike's Peak. A party of emigrants were going across the plains, and they came upon a wagon in a very dilapidated condition, drawn by two or three skeleton horses, or "hair trunks," as they would be called out there, and on the side of the wagon was inscribed these words: "Pike's Peak or Bust." [Laughter.]

With regard to finance, I cannot speak too highly of Col. McLaughlin's arrangements. A year ago he asked us for a certain sum which would carry him up to July, when he thought to make returns. Up to the end of July he had not only not expended that sum, but he had enough to pay costs for August, September, October and November, and still leave a balance undrawn. [Cheers.] I must say that in all his estimates he has always been within the mark, and I believe the estimate he has given us of 3200*l.*, unless special circumstances arise, will enable him to carry on the work till he gets returns next year. If we want this additional money, we trust to be able to raise it among ourselves. Can I give you a greater proof of the belief of the Board in this property than that? [Cheers.] We are going to ask you to allow us to issue the remainder of the priority shares. We might want to issue a couple of thousand of them—I do not think more—but we intend, if we possibly can, to carry this thing to a successful issue without having to appeal to you for more money.

As to the present position of affairs, the new foot dam has been partially completed, and the Colonel writes that we shall have no difficulty in finishing it next season and moving the elevators. We may hope, I think, for a fairly dry season in California. It seems to me that the seasons have altered since I was there. I suppose they are passing through a cycle of wet years. The first year I was in California we had no rain until December 22d, and the second year none until February and March; but now we are having storms in October and November, and heavy rainstorms all through the spring. I was reading a book by Mr. Nottage, of the London Stereoscopic Co., entitled "In Search of a Climate." He was in California in the first three months of this year, and they told him that more rain had fallen during the first three months than had fallen during the whole of 1891 and 1892. No wonder, then, that we were delayed in getting to the river-bed this season. But so far this year the rainfall has been 5½ inches, as against 8¾ inches to the corresponding date of last year, so that I think, gentlemen, our present position is more hopeful than ever it was before. In conclusion, I have no doubt you have come here feeling very sore about this business. We, too, feel sore that we have had a wasted season—no, not wasted, for we have been able to do work for next year. I have had the opportunity of talking of late with a great many shareholders, and find that, underlying this feeling of disappointment, there is a strong belief in the value of this claim and in our general manager, Col. McLaughlin. Strong in that belief myself, I ask you to-day, on behalf of the directors, to pass these accounts, and then to wait patiently somewhat longer (I do not think it will be long) for that success which we believe as strongly as ever will yet crown the persistent efforts that have been made to work this bed of the Golden Feather river. [Cheers.]

Mr. Alfred Borwick, director, said: The struggle to control the flow of that great Feather river against all the forces of nature, as the chairman has said, intensified as they are in that tropical climate, is indeed what might be termed a "battle royal." Col. McLaughlin has had many disappointments and reverses, but I can tell you he is very far from beaten, and if we continue to give him the confi-

dence he has hitherto enjoyed, I am sure you will arrive at the success you all so much desire. Many shareholders have said to me from time to time: "These failures and disappointments are very depressing, and we feel inclined to be sick of the whole concern." I can only tell them, as I tell you, to be of good courage, and I ask them to think what the effect must be on the mind of Col. McLaughlin. He has to conduct this great work single-handed a great part of the year, when malarial fever is about and amid difficulties, of which you have no idea, that have to be encountered and overcome. He has no incentive to carry him on with this work except loyalty to the shareholders and the most ardent desire to redeem every promise that he has made to them. What, then, must be his feelings at the end of a season to find that six months of labor have been profitless and fruitless. Most men would throw up the thing in despair and let the river flow on undisturbed; but he is made of tough fiber, and is one who never says "die," and who will not turn his hand from the plow. The gold is at the bottom of that river, and if it had not been extremely difficult of recovery the river-bed would have been cleared long ago, and it would only become ours now because we have a manager who has a lion heart and possesses all the qualities, mental and physical, which will enable him to bring the work to the success he has prognosticated. [Cheers.]

The chairman said: I propose "That the shareholders desire to express their continued confidence in their general manager, Col. McLaughlin, and thank him and the staff at the mine for their exertions on behalf of the company in the face of adverse circumstances." Adopted by acclamation.

Brief History of Petroleum.

By A. C. Benedict, Assistant State Geologist of Indiana, in *Clay Journal*.

A variety of liquids, variously known as coal oil, crude petroleum, earth oil, maltha, mineral tar, naphtha, steinoll, bitumen liquid, etc., and corresponding in the characters of inflammability and insolubility in water with the animal and vegetable oils, have long been known to occur in many parts of the earth.

The countries most famous for the occurrence of mineral oils are the United States, Russia, Burmah and the West Indies. They also occur in China, India, Italy, Germany, Switzerland, and in limited quantity in France and England.

Chemically, all the various products known as naphtha, petroleum, etc., are closely allied, as they consist mainly of oils of different density and volatility.

The earlier analyses of oils were crude, inasmuch as no further attempt at separating the substances they contained was made than merely heating the oil, cooling the vapors of distillation, and treating the product with sulphuric acid. This sufficed to show that the constituents of petroleum are compounds of hydrogen and carbon. It was not until a comparatively recent date that any advance was made in the chemistry of the hydrocarbons, but now we have a long list of articles of the utmost importance in the arts and sciences derived from the researches of the chemists in this direction.

The earliest analysis of petroleum I have been able to find a record of is that of Winterl, made in 1788, of a black, heavy-bodied petroleum from Hungary, which yielded a colorless oil, a yellow oil, and a buttery mass. The last was probably an impure paraffine. In 1817 the native naphtha of Miano, in the duchy of Parma, Italy, was used for lighting the streets of Genoa. This is probably the earliest use by a city of crude petroleum for lighting purposes. In an account published at that time it is described as being a transparent thin yellow liquid, lighter than water, with a strong, persistent smell.

Bitumens are found of all degrees of consistency and of many shades of color. The naphtha of Georgia, on the Caspian sea, is as colorless as pure water, while the asphaltum from the island of Trinidad is a black semi-solid body called the "bitumen lake." The light, clear oils consist almost wholly of carbon and hydrogen, while the heavier, darker and more solid varieties usually contain oxygen, and frequently sulphur and its compounds, carbon and bituminized carbonaceous matter.

The well-known odor of crude petroleum is nearly always due to bituminous matter, spoken of above, or to sulphur compounds, as sulphureted hydrogen. To the last is due the odor noticeable in the waters of many of the artesian wells.

From the colorless varieties we pass by imperceptible gradations through the heavier and darker varieties of petroleum to mineral tar or pitch, that is generally considered petroleum, in which there is enough bituminous matter either dissolved or suspended to render it black and of a semi-fluid consistence. This mineral tar is intermediate between the light-bodied oils and the solid asphaltum.

New Method of Separating Gold from Impure Amalgam.

J. C. F. Johnson, Adelaide, in the Australian *Mining Standard*.

I had submitted to me lately a sample of amalgam from a mine in West Australia which had proved a complete puzzle to the manager and amalgamator. The Mint returns showed a very large proportion of impurity, even in the smelted gold when retorted only, and the authorities refused to take it, after the first two cakes of 119 oz., which yielded only 35 oz. 5 dwt. standard gold, and 140 oz., which gave 41 oz. 10 dwt. The gold smelted on the mine was nearly as bad proportionately—thus, 128 oz. smelted at the Mint to 87 oz. 8 dwt., and 109 oz. to 55 oz. 10 dwt. The impurity was principally iron, a most unusual occurrence in my experience, and due, as I found on inspection and assay of the ore and mine water, to two causes—an excess of arsenate of iron in the stone, and the presence in large proportions of salts, principally chlorides of calcium Ca Cl_2 , sodium Na Cl , and magnesium Mg Cl_2 , in the mine water used in the battery. The exact analysis of the water was as follows:

Fe CO_3	2.76	grains per gallon
Ca CO_3	7.61	" "
Ca SO_4	8.71	" "
Ca C_2	2797.84	" "
Mg Cl_2	610.13	" "
Na Cl	5072.65	" "

Total solid matter..... 8572.70 = 19 5/8 oz.

It will be seen, then, that this water is nearly four times more salt than that of the sea. The effect of using a water of this character, as I have previously found, is to cause the amalgamation of considerable quantities of iron with the gold, as in this case. I received 10 oz. of amalgam, and, having found what constituted its impurities, proceeded to experiment in its treatment. When retorted on the mize it turned out in a black cake, so impure as almost to make it impossible to smelt properly. I found the same result on first retorting, and, after a number of experiments which need not be recapitulated, though some were fairly effective, I hit on the following, which was found to be most successful, and will probably be so found in other localities where similarly unfavorable conditions prevail. I took a small ball of amalgam, placed it in a double fold of new fine-grained calico, and after soaking in hot water, put it under a powerful press. The weight of the ball before pressing was 1583 gr. From this 383 gr. of mercury were expressed, and five-eighths of a grain of gold was retorted therefrom. The residue, in the form of a dark gray and very friable cake, was powdered up between the fingers and retorted, when it became a brown powder, and afterward calcined on a flat sheet in the open air; result, 50 gr. of russet-colored powder. Smelted with borax, the iron oxide readily separated with the slag; result, 311 gr. gold 871-1000 fine. A second smelting brought this up to 914-1000 fine. Proportion of smelted gold to amalgam, one-fifth. The principal point about this mode of treatment is the squeezing out of the mercury, whereby the amalgam goes into the retort in the form of powder, thus preventing the slagging of the iron and enclosure of the gold, as in the ordinary cake. The second point of importance is thorough calcining before smelting. Of course it would be practicable, if desired, to treat the powder with hydrochloric acid, and thus remove all the iron, but in a large way this would be rather expensive, and my laboratory treatment, though necessarily on a small scale, was intended to be on a practical basis.

They are now treating the amalgam at the mine in this way with great success.

The Southern Oregon Mines.

G. W. Davis, a California mining man, who has been quietly inspecting the southern Oregon gold district, with a view to investment, has been in Portland, where he was interviewed by an *Oregonian* reporter. He believes that if capital were invested in building roads over the mountains and improving the transportation facilities southern Oregon might soon lead the world in gold production. He is of the opinion that many fine prospects, which are really worthless to their present owners, might be developed into paying properties if placed in proper hands and backed by sufficient capital. Many of these prospects, Mr. Davis states, are in such out-of-the-way places that thousands of dollars must be expended on roads before the proper sort of developing machinery can be hauled in. Then another outlay of capital must be made before the investor can get any returns.

"But in my judgment," he continued, "there is sufficient evidence of the presence of gold to justify the expenditure of capital. The surface croppings in a number of prospects I examined are the finest I have ever seen in any part of the country. The success of the Ashland mine indicates what perseverance in developing will do. There are other properties which I think will soon be on an equal footing with the Ashland. The Contenton mine, situated

on Williams creek, about 18 miles southwest of Grant's Pass, was discovered about 18 months ago by a man named Bailey, and now produces a free-milling ore which runs about \$15 per ton. The owners are doing a great deal of development work. They have reached a depth of nearly 150 feet, and have done over 600 feet of tunneling. The mine has been prospected for 800 or 900 feet on the surface, and 400 feet of tunneling shows a continuous vein, the average depth of which is about four feet, and the paying streak shows a tendency to widen. There is an eight-stamp mill on the property.

"I heard a great deal of the Hammersly mine, on Jump-Off-Joe creek, about 16 miles northeast of Grant's Pass, but did not have time to personally investigate it. I understand Messrs. Goodsell & Drew are the owners of this property, and that they have made a rich strike. They have reached a good depth, and drifting has shown that the ledge is increasing in size. There is a small mill on the property.

"Investors, as a rule, do not take much stock in placer mining, but southern Oregon offers some great opportunities in that direction. Nearly all of the best placer claims have been taken up. There are consolidated claims covering hundreds of acres, but they are owned by bankrupt companies, who will not sell out except at a fancy figure. There is a big claim on Grave creek which covers about 700 acres and is owned by Portland parties, I believe. A 15-mile ditch is under construction which will furnish a good supply of water during eight months of the year. It is seven feet in width at the top, three feet deep and gives a supply of 3000 miner's inches. It is expected that the ditch will be finished by February 1st. Most of the placer claims can only be worked a few weeks in the year, owing to the scarcity of water in their vicinity.

"Taking into consideration all of the difficulties in the way, I consider the mines of southern Oregon equal to any on the coast."

Oregon's Mammoth Caves.

Captain A. B. Smith went from Josephine county to Portland lately to submit a proposition to the Oregon commissioners of the Midwinter Fair, says the *Oregonian*. The captain is chief owner of a mammoth cave, whose entrance is twelve miles north of the State's boundary line, and which has been explored for a distance of 22 miles, partly underlying California's surface. The end of the cave has not yet been reached. It is a chain of spacious chambers, some of them being 326 feet in diameter, and the ceiling of none of them being less than 50 feet from the floor. Captain Smith wants to have one of these chambers duplicated in plaster of paris and exhibited at the San Francisco fair as one of Oregon's natural wonders, and that is what he came to see the commissioners about. It would require considerable money to defray the cost of arranging the exhibit, but the captain believes that it would more than clear itself if a small fee were to be charged for the privilege of inspecting it. At the World's Fair there was a plaster of paris imitation of a portion of Kentucky's mammoth cave that earned bushels of dollars for its proprietors, and Captain Smith declares that his cave is as far ahead of the Kentucky cavity in all the elements of attractiveness as Kentucky whisky is in front of Chinese gin as an agreeable beverage.

"We have 600 chambers in sight and an incalculable number to find before we reach the end of the cave," said Captain Smith last evening. "The chambers lie in nine different strata—granite, marble, limestone, redstone and others—and almost every one of the natural apartments contains a marvel of some kind aside from its stalactites and stalagmites. In the 'Lord's Supper chamber' there is an almost perfect facsimile in limestone of the famous painting. The 'fairy chamber' is in a stratum of California diamonds. The 'tornado chamber' is visited by a wind storm every 24 hours. In the 'rain chamber' there is a perpetual drizzle, and the 'steam chamber' is constantly filled with steam from an undiscovered source. A coffin resting on stalagmites is the feature of the 'death chamber,' and the 'bridal chamber' is ornamented with a solid stone four-post bedstead. Then there is 'Sullivan's chamber,' so called because of a mighty arm and fist pendant from the ceiling, and others too numerous to mention, much less to describe. A reproduction of any one of these chambers would prove a drawing card at the Midwinter Fair."

Some San Francisco people of a scientific turn are organizing a party to resume exploration of Captain Smith's cave this winter, and Senator Mitchell is endeavoring to get an appropriation from Congress to enable the Smithsonian Institute to take a hand in the game. The railroad point nearest to the cave is Grant's Pass, 70 miles from the entrance, but a surveying party is now laying out a new road from the cave to Jacksonville, for a distance of 26 miles.

Gold Mining in Chili.

The *Chilian Times* calls attention to this subject in a recent issue, and in view of the great depreciation of silver the question is undoubtedly one of serious interest to most South American countries. To Chili it is of serious importance, and it will be the duty of its rulers, in view of the uncertain future of silver, to do all in their power to promote and develop the production of gold within the limits of that country. Hitherto no practical steps in this direction would appear to have been taken, but the time has surely come when a *laissez faire* attitude in this respect ought to be abandoned, and when enterprise should be encouraged and fostered with the object of utilizing the auriferous resources of the republic. The precious metal exists in its territory in considerable abundance; it is, roughly speaking, found "everywhere throughout a length of 3000 miles," of course not always in paying quantities, but the facts go to show that an immense treasure is there which industry might profitably place at the service of mankind, with every prospect of affording satisfactory returns for the capital and labor employed to win it from the bowels of the earth.

At a recent meeting of the Scientific Society of Santiago, Mr. R. Herrmann, the president of that body, broached an interesting theory in connection with the auriferous deposits of Chili. In the course of an address, alluding to the geological formation of the gold-bearing region in the Transvaal, he suggested that there might be a similarity between it and that of the republic. We quote as follows from our above-named contemporary: "Mr. Herrmann believes that it is very probable there exist in the tertiary formation of Chili beds of auriferous conglomerates. The carboniferous formation, which is one of the oldest of the tertiary formation, is of great area in Chili and extends all the way from Dichato to Magallanes. It is a well-known fact that gold is found in all the rivers and streams in the carboniferous region, and Mr. Herrmann arrives at the following conclusions: 'The rocks upon which the Chilian carboniferous formation rests, and those which divide them, are auriferous, and the inferior stratum in this carboniferous formation is composed of conglomerates. Therefore, it would be worth while to ascertain if these conglomerates contain gold or not, and, if they do, to examine them at different places for the purpose of ascertaining if they contain gold in paying quantities.' " This is the problem that Mr. Herrmann submits to the consideration of the country, and it is to be hoped that his suggestion for the examination for what he believes to be gold-bearing conglomerates may not be ignored by the Sociedad Minera and the government.

Modern methods and machinery have greatly improved and cheapened the processes for the extraction of gold, and to such an extent is this the case that profits can now be obtained from the treatment of low-grade ores, such as, without exploration, are known to be plentifully available in Chili. This is especially so in the central zone, where, in addition, there are accumulated hundreds of thousands of tons of tailings capable of being made to yield a handsome return. The gold is in the country, and the Chilians have both money and industry, if other conditions are provided, foremost among which ranks the necessity for facile means of transportation. From the province of Aconcagua alone untold wealth can be acquired, and the provinces of Coquimbo and Atacama are rich beyond the dreams of avarice. Under the altered circumstances brought about by recent events the Chilians cannot afford to disregard their auriferous deposits, and manufacturers and patentees of mining machinery and methods would do well to supply the Chilians with particulars, for, says the *Chilian Times*, "there are not wanting signs of a reaction in favor of gold mining."

Not long ago some person sought to decrease the yield of a crushing in one of the mills in Amador county by "greasing" the battery, an old trick around mining camps. There are various other ways of making amalgamation difficult or impossible. It may be done by "leading" the ore or the quicksilver or to pour some heavy oil on the dump to be crushed, such treatment having its bad effect as soon as it gets to the mortar. Unless a millman discovers the trick in time he may otherwise run away much of the metal in the ore. The *Amador Ledger* says that in this instance nothing was known as to the condition inside until the cleanup was commenced, when chunks of bacon rind were found mixed with the quartz, the bacon having been worn away by the action of the stamps. The pieces were altogether too large to have got in in any way except by design. The crushing was not improved by the treatment, and such methods will be guarded against in the future. Miners in Amador county are entitled to all they get and never object to striking a "greasy" spot now and then, but this process of extracting fat does not meet with approval.

Scientific Progress.

Water Bacteriology and Sand Filtration.

The importance of bacteriological studies of water supplies have been recognized by scientists for only a few years, and it is only since the recent cholera scare that such studies have received much consideration in this country, except among the advanced students of sanitation. Some facts and reflections in this connection are given in *Longman's Magazine* for December, by Mrs. Percy Frankland, from which the following information has been taken:

"For many years artificial sand filtration was considered by chemical experts as of no value, because it effected so little chemical change in the water. It was used to produce a clear rather than a pure water.

"In 1885 the new bacteriological water tests of Dr. Koch were for the first time applied to the London water supply by Prof. Percy Frankland, resulting in the surprising demonstration that by sand filtration the number of bacteria in Thames river water was reduced 99.2 per cent. Regular monthly examinations of the London supply were afterward made by Prof. Frankland, which, with numerous studies elsewhere, have shown conclusively the value of sand filtration for the removal of bacteria from water."

It is interesting to note in connection with the London investigations that at the time when these results were first published, the public, instead of being reassured by these facts, were greatly alarmed, and it is a matter of history that the mere demonstration of the presence of micro-organisms in drinking water caused a fall in the price of several of the water companies' stocks!

Reference is made to the well-known fact that Altona, with a filtered water supply, almost escaped the cholera epidemic which recently raged in the adjoining city of Hamburg, with an unfiltered supply from the same river.

Mrs. Frankland states that, while there can no longer be any doubt of the value of sand filtration, "the slightest imperfection in its manipulation is a constant menace during any epidemic"—a statement, remarks the *Engineering News*, which is obviously just as true of any other form of water purification. Prof. Frankland's London studies show that during the winter the unfiltered water is generally richest in bacterial life, and that at the same time the largest number of bacteria are present in the filtered water—facts that demand great care in the winter management of filters. In conclusion, Mrs. Frankland states:

"The bacteriological methods for the examination of water, although when first introduced but a few years ago were lightly looked upon, and by many opposed, have now become of paramount importance in all questions of water purification. The immense mass of evidence of a purely bacteriological character which was recently taken, and, indeed, required by the Royal Commissioners on the London water supply, indicates clearly enough the change which has taken place in the public estimation of the value of these methods, and it is highly significant that in their report the commis-

sioners lay stress upon the importance of extensive storage and efficient filtration, two factors the meaning and worth of which rest almost entirely on the results of bacteriological research."

Detecting Mine Gases.

The eminent French scientist, Gaston Tissandier, describes an absolutely new method of determining the quantity of foreign gas contained in air by the passing of the gaseous mixture through sonorous tubes. The invention is credited to M. E. Hardy, a distinguished French physician, who calls it the "formenophone," and intends it primarily for the detection of fire-damp in mines. One of the best detectors of gas yet known is the safety lamp, but it has the radical objection that the aureole around the flame, which indicates the presence of dangerous fumes, does not show itself until such a quantity of gas is present as constitutes a critical danger. The formenophone, on the contrary, gives the indication in a few seconds. The principle on which it is based is that when two organ tubes, giving the same pitch, are subjected to the influence of two equal blasts of pure air the sound produced is identical. But, everything else being equal, if one of the tubes is blown into by a mixture of air and gas of different intensity, the sound of the tube is correspondingly modified, and the vibrations produced are more or less frequent as more or less gas is mixed with the air. This occurs with such unvarying results that Mr. Hardy has been able to lay down a regular scale of vibrations and their significance for the guidance of those using his invention. The apparatus consists, briefly, of two blowers, or pairs of blowers, enclosed in air-tight metallic envelopes. One of these cases contains pure air only, and to the other is conducted by a pipe the air of the part of the mine to be tested. The air in each receptacle is blown by the disengagement of a weight on the top of the bellows, whereby downward and forcible pressure is immediately produced into the organ tube with which each receptacle is provided.

The resultant sound is so intensified by a special adaptation of the microphone and telephone that it can be distinctly discerned, and a comparison of the difference in sound of the two tubes gives an absolute indication of the quantity of gas in the air tested.

Soap-Bubble Solution.

According to a communication recently made to the Academy of Sciences, the following solution makes very thin and permanent bubbles:

Yellow resin..... 10 grammes
Carbonate of potash..... 10 "
Water..... 100 c. c.

Boil until completely dissolved, and before use dilute the solution with four times its volume of water. It is somewhat difficult to float soap bubbles upon carbon dioxide because if you managed after a score of trials to free your bubble from the pipe on which you blew it the bubble usually bursts the moment it touches your heavy gas. You must remove every trace of hydrochloric acid, which is carried over with the gas, by washing, the presence of this acid being fatal to the life of a soap bubble.

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No one seems to expect any special improvement in the steam engine, so far as its form or principle is concerned, but by using nickel-steel instead of mild steel for its construction, greater lightness and strength would be secured, remarks the *New York Tribune*. Still more radical changes in boilers are recommended. At present the latter are too heavy. The multi-tubular type, already used for some yachts and torpedo-boats, would give more steam for the same space; and though individual specimens of this sort, especially the locomotive form, are objectionable because the motion of the ship is liable to bare portions of the uppermost flues at times, confidence is expressed in the feasibility of so modifying the system as to adopt it to marine service. By forced draft and a blast of air heated by the smoke and escaping gases combustion may be made more complete, and more power got out of the same amount of coal. Mr. Newman thinks that boilers might safely carry 500 or 600 pounds pressure; at present 250 or 300 is about the maximum. Mr. Melville regards a piston speed of 90 strokes a minute, which has been gradually attained of late years, a limit that may easily be surpassed. The engineer-in-chief, too, recommends higher smokepipes for increasing the natural draught.

Mr. Newman points out the great advantage which oil possesses over coal for fuel. Twice as much work can be got out of the same bulk; and he wonders why America and Western Europe have been so slow in imitating South and Eastern Russia. Steamers on the Volga and Caspian have long used with great success the waste products resulting from the manufacture of petroleum. The saving of space would admit of the use of more powerful machines and larger freight service; and oil requires less labor than coal for stoking. With the general improvements here suggested, and without change of model, Mr. Newman believes that it would be possible for steamers to make 25 knots an hour.

Gas from Peat.

A report by T. C. Linton, engineer of the Leith (Scotland) works, was submitted at the last meeting of the Edinburgh Gas Commissioners as to the manufacture of gas from peat. A quantity of black peat was procured from the Wellington Reformatory Farm, Penicuik, but as the results from it were entirely worthless, owing not only to the quality of the peat, but to its being in an undried state, it was resolved to procure other samples of peat dried in the usual manner. One of these samples was procured from the Leadburn district, the other was obtained from Orkney. The results proved that even the best quality of peat could not compete at all with coal for gas-making purposes. There were, moreover, other drawbacks besides the hopelessly inferior results yielded to be considered. The

excessive proportion of carbon dioxide produced (from six to seven times as much as in crude coal gas), which had to be removed from the gas, would make the cost of purification enormous.

Automatic Gem Separator.

An automatic gem separator, described by William S. Lockhart, has been devised for the purpose of selecting precious stones from the worthless gravel with which they were associated without the intervention of hand picking as now practiced, thus avoiding the danger of loss by theft and other disadvantages. In South Africa, Burmah, Siam, Ceylon and other parts of the world the systems of washing vary to some extent, but all systems resolve themselves finally into the picking over of a concentrated deposit of clean-washed gravel for the gems it may contain, and it is, says Mr. Lockhart, at this point that the separator comes in to perform what has heretofore been done by hand.

To Make Glass Pipe.

A system of manufacturing glass pipe by rolling molten glass down in flutes, or grooves, and using a core to complete the formation of the tube, has been proposed by P. Sievert, of Dahlen, Saxony. Molten glass is poured from a reservoir, or hopper, into the bite of two rollers. The rollers are placed horizontally, each being provided with grooves in which is placed a core of suitable dimensions. When the core is moved downward the molten glass follows the movement and forms a tube, the dimensions of which are determined by those of the ring-shaped space between the contours of the grooves and the core. The circumferential velocity of the rollers regulates the speed at which the core is lowered.

Uses of Coal Oil.

Coal oil is used for fuel not only under steam boilers on land and afloat and in locomotives, but in furnaces for making crucible steel. A plant of this class was recently described by W. E. Crane of Waterbury, Conn., before the American Society of Mechanical Engineers. Regarding such use of oil with engines the *Iron Age* recently raised an interesting point. In summer oil will flow freely through the supply pipes; in winter extra heat may be required to keep it in a fluid condition. Broken pipes and other such repairs might easily modify the economy of using that sort of fuel.

Longest Drawbridge Span.

The longest drawbridge span in the world, so it is claimed, is that now being constructed between East Omaha and Council Bluffs. It measures 520 feet from end to end. That at New London, Conn., is 503 feet long and one over Arthur Kill, Staten Island, just 500. The new drawbridge of the New York Central, over Harlem river, has an extent of only 389 feet, but it provides for four tracks and is the heaviest one in the world, weighing 4,400,000 pounds. The one at East Omaha will weigh, when completed, about 3,000,000.

Fine Grinding Process.

A lathe hand has been studying on the grinding problem, and has discovered that there is always a slotted feed shaft just under the lathe bed that will give a good chance to work from, says the *Chicago Journal of Commerce*. A small pulley is used, slip-keyed to this shaft, that keeps right along with the lathe carriage, and belted up to such an extent that a high speed is attained for a grinding spindle. In this way some fine grinding can be obtained without any of those overhead contrivances that are so unsightly in a machine shop.

Useful Information.

What Pearls are Made of and Where They are Found.

Very few people are aware that the pearl oyster is not in any way like the oysters which we eat. It is of an entirely different species, and, as a matter of fact, the shells of the so-called pearl oyster are of far more value to those engaged in "pearl fishing" than the pearls, says *Harper's Young People*. There are extensive pearl fisheries in the Gulf of California, and some of the finest pearls have been taken from these waters. In 1881 one pearl, a black one, was sold for \$10,000, and every year since that time many pearls have been taken from the beds in the Californian gulf valued at \$7500 each. But such "finds" are very rare, and, as a rule, the pearls which are brought up are of very little value. The shells, however, are very valuable; most of them are shipped to Europe, where they are manufactured into ornaments, knife handles, buttons, and various other articles for which "mother of pearl" is used.

Another fact concerning the pearl oyster and the pearl itself is very little understood. I have seen in books of instruction, both in this country and in England, the statement that "the formation of the pearl in the oyster shell is caused by a disease of the oyster;" and this statement is more or less generally believed, as is also the erroneous inference to be drawn from it, that the oyster referred to is the edible oyster. The mother of pearl is nothing more than a series of layers of nacreous matter deposited by the oyster upon the interior of the shell, and the pearl itself is a perfectly accidental formation. It is caused by a similar deposit of nacre around some foreign object. This foreign substance may be a grain of sand, a parasite or some similar object; but most authorities agree that it is more usually an undeveloped egg of the oyster around which the natural deposit is thrown.

The largest pearl ever found measures two inches long and weighs three ounces. This is of Eastern origin. The largest found in the Gulf of California did not exceed an inch and a quarter long, and was somewhat larger than the egg of a bluebird. Many of the Californian pearls are black and speckled. These are considered more valuable than the white pearls in Europe, but the most highly prized pearls of all are pink.

Some Interesting Dates.

The apple-parer was given to the public in 1803. At the present day, one Eastern firm makes over 27,000 a year.

Matches were first invented in 1839, and it is estimated that 75,000,000 a day are burned by the people of the United States.

The blast furnace was devised in 1842. In 1890 the United States alone made 9,000,000 tons of iron and 4,277,000 tons of steel.

Washboards with a metal face were patented in 1849; now the backs of the American women are weekly bent over 6,000,000 of these useful articles.

Window glass was first used in modern times in 1557. Now the consumption of plate glass alone exceeds 6,000,000 square feet in England and 9,000,000 in the United States.

A machine for making tacks was patented in 1806, but not put into practical use until near the middle of the century. Now the world consumes 50,000,000 tacks a day.

The nail machine was invented in 1775. At the present time it is estimated that 4,000,000,000 nails are annually made by machinery in Great Britain alone, and from a fourth to a half of this number in the United States.

The first forks made in England were manufactured in 1608. Their use was ridiculed by the men of the time, who argued

that the English race must be degenerating when a knife and spoon were not sufficient for table use. Last year a Sheffield firm made over 4,000,000.

Breech-loading rifles were invented in 1811, but did not come into general use for many years. It is estimated that over 12,000,000 are now in actual service in the European armies, while 3,000,000 more are reserved in the arsenals for emergencies. Statisticians say that there are 100,000,000 guns of all kinds in the world.

The railroad system of this country began in 1827. Now there are 214,528 miles of track in the United States, and 354,310 in the world. The number of passengers carried by the United States railroads in 1892 was 555,025,802, and the total earnings were \$1,138,024,459. The capital stock was \$4,800,176,651, and the dividends \$90,719,757. The number of men employed was 784,285.

The harvester was invented by McCormick in 1831. Since that time this machine has been brought to such perfection that, it is said, it will cut and bind an acre of grain in 45 minutes. To such an extent has machinery superseded hand work in the grain farms of the Northwest that it is estimated that the labor of one man will raise enough grain to support a thousand men for a year, while the labor of a second will transport it to market, and that a third will prepare it for food.

Curious Facts.

Somebody who claims to know says that a child three years old is half the height it will ever be.

A bat can absorb and digest in one night three times the weight of its own body. Bats never have more than two little ones at a time.

An English officer, being hypnotized in South Africa, began to speak in Welsh, which he had known as a child, but forgotten for 20 years.

The idea of an ancient tropical continent at the south pole, uniting South America, Madagascar and Australia, is arousing considerable interest and discussion in scientific circles.

A break in the main water pipe in a street in Tombstone, Arizona, recently, was found to have been caused by the roots of a tree which had grown around the pipe and crushed it so that it burst.

The rudder of the Cunard steamship *Campania* consists of a single plate of steel 22 by 11 feet 6 inches and 1 1/4 inches thick. It was rolled at Krupp's German gun factory.

In South America among the mountains the evergreen oak begins to appear at about 5500 feet, and is found up to the limit of the continuous forest, which is about 10,000 feet. The valuable cinchona tree, from which Peruvian bark is obtained, has a range of elevation on the mountain slopes running from 4900 to 9500 feet.

A new pneumatic tire brought out in England, which is described as a really good thing, has a pad of prepared cotton wool covered with soft cloth, which is inserted between the cover and air chamber, rendering it almost impossible to puncture it even with a sharp awl. The weight of this pad is 50 ounces, and the cost is trifling.

Water boils at different temperatures, according to the elevation above the sea level. In Baltimore, water boils practically at 212° F.; at Munich, in Germany, at 209 1/2°; at the City of Mexico, in Mexico, at 200°; and in the Himalayas, at an elevation of 18,000 feet above the level of the sea, at 180°. These differences are caused by the varying pressure of the atmosphere at these points. In Baltimore the whole weight of air is to be overcome. In Mexico, 7000 feet above the sea, there are 7000 feet less of atmosphere to be resisted; consequently less heat is required, and boiling takes place at a lower temperature.

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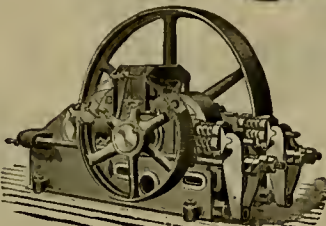
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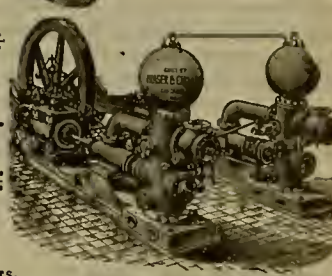
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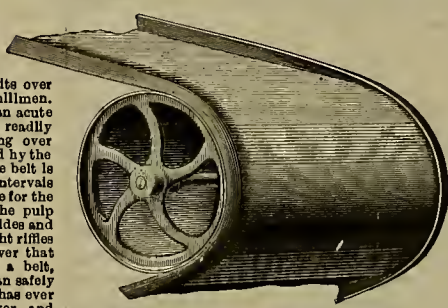
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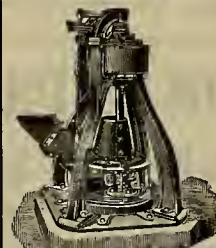


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Electricity.

Electric Cooking at Redlands.

Electric cooking is being tried at Redlands, Cal. The *Facts* says: "While passing the office of the Electric Light Company the other day a *Facts* representative was attracted by the appetizing odor of coffee. On investigation he found that the company's officers were demonstrating the efficiency of their new line of electric cooking apparatus. President Sinclair, while in the East, partook of a dinner cooked wholly by electricity, and is more than ever convinced of the efficacy of the electric fluid as a fuel for cooking. As we examined the various utensils, noted their simplicity, safety and convenience, we were convinced that where electric power can be secured at reasonable rates, the old wood and coal stoves for cooking will be supplanted with electrical appliances.

"Another direction in which we learned that electricity is being applied is in laundry machinery. Here there is a great saving of heat and discomfort, while in residences already using electricity for lighting, the additional cost is trifling.

"Assuredly this is the electric age, and if all indications are correct, we are yet only on the threshold of its development."

In Behalf of the Trolley.

The International Tramways Congress, which met last autumn at Buda Pesth, passed the following resolution bearing upon electric tramways: "The electric tramways with direct current from a central station have given satisfaction on several lines on the continent now in operation, and this applies both to tramways with underground and to tramways with overhead conductors. The statistical figures hitherto available are, however, not sufficient to form a definite opinion about the financial aspect. The employment of electricity is, however, in the interest of the public, as not only will a greater speed be obtained, but it will also be possible to carry a larger number of passengers." The congress asserts that, in its opinion, the electric system of working should, therefore, be recommended to authorities and tramway administrators. The congress further holds that the authorities should endeavor to make it possible for tramway companies to undertake the expense of a change from horse to electric traction by extending the concessions, and permitting the use of overhead conductors.

Parcel Cars.

Electrical parcel cars, somewhat resembling in shape the post vans, will soon be seen in the streets of London. The novelty in the construction of the cars consists in placing the accumulators underneath and outside the body of the vehicle. It is estimated that for every mile run by an omnibus of one of the great companies the cost for horse traction is exactly 5d, while the cost for running an electric car would be just 2½d. The accumulators have been made so that they can be charged with electricity sufficient to last for four hours' work. The same electrical arrangement is about to be applied to broughams and private carriages.

The Erie Canal Experiments.

The closing of the Erie canal for the winter, remarks the *Electrical Engineer*, has brought temporarily to an end the recently begun experiments to apply the electric motor for canal-boat propulsion, which can be resumed at the opening of navigation next spring. The abandonment of the trolley pole in favor of the over-running trolley, similar to that used on the early Van-Depoele roads, was a foregone conclusion, the freedom of motion of the boat it permitted giving ample proof of its adaptability to this purpose. It appears also that the

matured plans of the promoters of the enterprise involve the application of high-tension alternating current reduced to a safe working pressure at the trolley lines for alternating motors.

A Failure of Arresters.

Recently in Milwaukee four hundred telephones were rendered useless as a result of a trolley coming in contact with a telephone wire, the strong current of the former being conducted into the terminal room of the telephone exchange. A vertical strip of current arresters four feet high, on each side of which are trained the subscribers' wires, was speedily ignited and it burned to the top. Twenty-five cables containing subscribers' wires, which are carried from the arresters to the switchboard, were destroyed, rendering about 400 lines unserviceable. The failure of the arresters to act is a mystery.

Electric War Engine.

A new engine of war has been invented by M. Turpin, the chief point of the invention being the application of electricity. A very light wagon, drawn by two horses, contains two groups of projectiles, and with the aid of four gunners, four charges can be fired off in a quarter of an hour, each throwing 25,000 missiles over a surface of 22,000 square meters. In spite of its extraordinary power, the invention is said to be perfectly simple in design.

Hypnotism in Disease.

The chief arguments used against the employment of hypnotism in disease are, first, that it subordinates and enervates the will; second, that it renders the patient liable to be influenced by persons of evil intent; and third, that only nervous or hysterical persons are subject to its influence, says James R. Cooke, M. D., in *Arena*. My own experience is that it may be used without injurious effects, and also that it may take the place of narcotics in a large number of cases in which they are now used. I have myself used it with advantage in delirium, in insanity and in chronic alcoholism. I have successfully treated one case of kleptomania and two cases of excessive irritability of temper. At the same time hypnotism is a two-edged sword. Wielded by an unskilled hand, it may cut both ways deep into the faculties of intellect and into the nervous system generally. Also, it should never be used save by a skilled hand upon patients of an unbalanced mind accompanied by what is known in medical parlance as *paranoia*. In my treatment of a perfectly healthy, calm, intelligent, unimaginative man, whom I operated on 51 times, I found that the diapason of his whole mental and emotional system would give forth concordant sensations of pleasure or discordant sensations of pain, at the will of the operator.

Summing up, I would say that in hypnotism, as with every other new remedy, there is great danger that, on the one hand, it may be used indiscriminately, or, on the other hand, be scouted by a senseless skepticism. It has, beyond doubt, its definite limits of usefulness, and the medical man of the present day, realizing the futility of many of the old methods of treating disease, should keep his mind open to the reception of every new discovery.

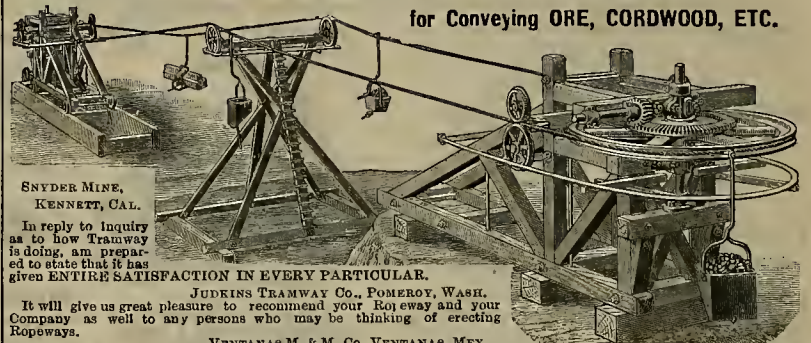
Good Lemonade.

For a quart I take the juice of three lemons, using the rind of one of them. I am careful to peel the rind very thin, getting just the yellow outside; this I cut into pieces and put with the juice and powdered sugar, of which I use two ounces to the quart, in a jug or jar with a cover. When the water is just at the tea point I pour it over the lemon and sugar, cover at once and let it get cold. Try this way once, and you will never make it any other way.—Scientific American.

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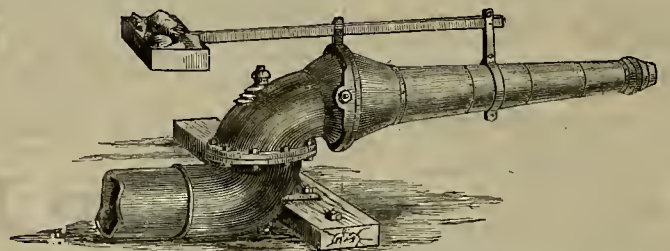
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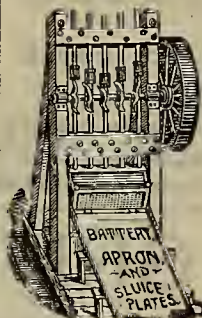
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Coast Industrial Notes.

—English stockholders propose to re-organize the Bear Valley Irrigation Company in San Bernardino county.

—The California Sugar Refinery, employing between 800 and 900 men, which has been idle for six weeks, has again started up.

—For the first time in the history of the San Francisco and San Mateo Electric Railway the operations are showing net earnings sufficient to pay the interest on the bonds. The income, over and above all operating expenses, is reported to be \$5500 a month.

—It is said that the Armour Packing Company is contemplating the establishment of a packing-house in Nogales, Sonora, where can be put up for Mexican consumption the beef of Sonora. The low price of cattle there should make that industry a profitable one.

—The Tubbs Cordage and Rope Works are to resume after a shut-down of nearly four weeks. Fifty-three girls and 100 men are employed in this establishment. A reduction in the pay of the operatives has been announced, and those going to work again will be paid 25 cents each per day less than the old rates.

—The Gold Ridge Consolidated Mining and Milling Company has filed articles of incorporation. Principal place of business, San Francisco. Capital stock, \$10,000,000, with Louis E. Gray, Matt O'Donnell, C. M. Jennings of San Francisco, B. M. Lawrence of San Bernardino and John A. Henninger of Oakland as directors.

—Two hundred men are to be put on at the Pacific Rolling Mills, which have not been operated for a month. Three months' work is awaiting the employees of the mills, and other contracts will most likely keep the rolling-mills in operation for some time longer. The rate of wages at the mills has been modified 10 per cent.

—The farmers of Lake Washington and Duwamish basin, Wash., are petitioning the King county commissioners to drain their lands. They suffer a good deal from floods, and suggest as the most feasible method of relief that Cedar river be turned into Lake Washington, and the outlet from the latter into Lake Union be deepened and enlarged.

—Receiver Ira Bishop of the Piedmont Cable Company, Oakland, proposes to reduce the operating expenses at least \$12,000 a year by changing the road from Eighth and Washington streets to Mount View Cemetery from a cable to an electric line. The motive power of the Piedmont branch from the power-house will still be a cable, owing to the heavy grades on that line.

—W. F. Whittier, of the firm of Whittier, Fuller & Co., has retired from business in consideration of the sum of \$250,000, paid by his former partner. The bonus is said to be the largest ever paid to any individual in the history of commercial transactions in the United States. Under the terms of the agreement Mr. Whittier has promised not to engage in business again for a term of five years to come.

—Professor Burkhalter of Chabot Observatory, received word from Paris to-day that the great Arago medal, with 1000 francs, had been conferred on Professor Barnard of the Lick Observatory. The medal is given by the French Academy of Sciences for his discovery of the fifth satellite of Jupiter. It has only been conferred once before, and then on the illustrious French astronomer Leverrier for the discovery of Neptune.

—The Gila Valley, Globe and Northern Railway, which is to be constructed, will run from Bowie, Ariz., on the Southern Pacific, to Globe, 130 miles, passing through the Gila valley in Graham county, one of the richest in Arizona, where now over 30,000 acres of land are cultivated. Garland's construction outfit is now en route here from Ogden, and will arrive on the 1st prox., when work will begin. This road will open up a fine agricultural valley. It runs 70 miles down Gila river, ending at Globe, one of the richest mining districts in the territory.

—The extension of the Sacramento-street cable road from Central avenue to Lake street, and along Sixth avenue to Golden Gate Park, will be ready for passengers when the Fair is formally opened. As the roadbed stands at present it is finished, only a turntable is needed at the park terminus, and that will be moved in a night and put into place very quickly. The cable will be joined with the McAllister-street cable, which extends to Seventh avenue, one block farther west than the new terminus. This will be the first instance of a connection between the Market-street Company and any other line in this city.

—It would be difficult to convince the average man that fir is a stronger wood than

oak, but such has been proved by actual tests that were made by a fair and impartial committee appointed for that purpose, says a Tacoma paper. The timbers used were each two by four inches and four feet long, both ends solidly braced and the weight applied in the middle of the span. Yellow fir stood a strain of 3062 pounds, common Oregon oak, 2922 pounds; fine-grained yellow fir from near the butt, 3535 pounds; and the best Michigan oak snapped with a strain of only 2428 pounds. The tests were made by the Northern Pacific Railroad Company at Tacoma, Wash.

—The corps of United States Surveyors under John O. Rice, which has been employed resurveying lands in the mountains north of San Bernardino, has been compelled to suspend operations for the present on account of the snow impeding its progress. It is now camped at the foot of the mountains in the orange groves at Highland and does not expect to be able to resume work until April. Mr. Rice says that there are fine forests of fir and pine on 200,000 acres of land included in its survey, and some of the land is good and will raise profitable crops of apples, cherries, and in the lower foothills, olives.

—A new company is to be incorporated which will take the place of the Oakland Contracting Company, a corporation which with J. P. Cochran as manager, has done much street paving during the past five years. The capital stock is set at \$250,000, of which \$100,000 will be paid up. The name will be the Oakland Rock Company. A ten-year lease has been taken of Iron-rock mountain, a deposit of trap rock about three miles beyond the Berkeley line, and a ten-year contract made with the California and Nevada Railroad Company for transportation. A spur track about 3000 feet in length will be built toward the quarry; from the end of this a tramway 3000 feet long will be constructed. Iron-rock mountain is on the old McAvoy ranch.

—A bridge on the North Pacific Coast Railway, across Austin creek, near Cazadero, Sonoma county, gave way last Monday, precipitating Engine No. 6 into the water, and seven lives were lost. The water in Austin creek is 20 feet above its ordinary level and was rushing faster than it had been known to do in twenty-five years. Before the bridge collapsed the water was up to the rail and speeding like a cataract. The trestle was a new and apparently a strong one; but it seems that the piling on which the span rested was driven into the soft river gravel which was washed away by the flood, thereby leaving no support for the cross-beams. Therefore, when the weight of the engine came upon these latter the entire structure collapsed, precipitating the engine and its entire crew to the bottom.

The San Joaquin Land and Water Company, after six years of litigation among the stockholders has elected a new board of directors with a majority of the men who have been opposing the management, and the great project to bring Stanislaus river water in through a system of canals will be carried forward under a new directory. The new board of directors is composed of Colonel G. B. Sperry, W. C. White, Charles Belding, R. E. Wilhort, J. R. W. Hitchcock of the new forces, and N. S. Harrold, H. W. Cowell and A. M. D. McIntosh of the old crowd. The company owns valuable water rights near Knight's Ferry and has expended \$207,000 in the works, having a dam, several tunnels and a long line of canal nearly completed. The estimated cost of completing the work will be \$400,000, and the canals will carry water to 150,000 acres.

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Mining Summary.

The following is mostly condensed from journals published in the interior, in proximity to the mines mentioned.

CALIFORNIA.

Amador.

AT THE ARGONAUT.—*Ledger*: The Argonaut Mining Company has come to work with a will and is now advancing with its shaft at the rate of 20 feet per week. Three shifts of four men each are working in the mine; one man is running the engine and doing the blacksmithing, while one is in the carpenter shop. These with J. B. Francis as foreman constitute the working force. They have on the ground enough timbers, logging, wood and other supplies to sink the shaft 500 feet. The buildings so far erected consist of an engine house, which contains a donkey hoisting engine, a blacksmith shop, 24 x 24 and a carpenter shop, 12 x 24, the latter two being under one roof of corrugated iron, with sides of the same material. The Argonaut people have gone into the business of finding a mine with a determination to penetrate the bowels of the earth and thoroughly prospect the wealth of their ledge ore. They estimate the cost of their shaft with all accessories of development, to the distance they expect to have to go at \$100,000, and are prepared to expend that amount in its construction, not extravagantly, but economically. The business of developing a mine on the mother lode where depth has to be attained, is a very serious matter and requires mining ability as well as capital, both of which are found in the management of the Argonaut.

Calaveras.

TIMES LIVES.—*Prospect*: Mining throughout the entire county has taken a lively turn of late, and many mines wherein for years had not been "heard the sound of ax, hammer or other tool of iron," are now the scenes of lively operations, and it is safe to say that the bullion production of this county for the coming year will be greater than ever.

At the Dora mine at Esmeralda, a five-stamp mill is being put up and a road has been graded leading from the mine to the mill. The ledge in this mine is about two feet in width and the rock is very rich. It is the intention of the company to run a tunnel into the hill from where the mill stands which will tap the ledge about 400 feet from the surface.

The shaft in the Cunico mine opposite old San Domingo camp has reached a depth of about 400 feet. The ledge is about eight feet in width, and a great deal of the rock, which is exceedingly rich, is worked in a mortar.

The Austrian mine is situated on Indian creek, about a quarter of a mile above Frederick's place. The mine is worked by a tunnel several hundred feet in length and the rock is worked in an arrastra. The vein has paid from the very grass roots down, and the owners—Messrs. Vosovich and Tremontini—who have been working it for the past five or six years, have each accumulated quite a snug amount of money.

The Maria mine at Esmeralda has been bonded by the owner, John Saltuari, to San Francisco parties who have prepared to work the mine on an extensive scale. The shafts and tunnels have been cleaned out and re-timbered, a blacksmith shop built, a new road dug leading to the mine, and everything is in readiness, awaiting the order to start. The rock is very rich in free gold and sulphurets, and it is the intention of the company to send specimens of their ore to the Midwinter Fair.

F. J. Horswill has commenced operations upon his mine near Barker's, which has been idle for about a year. A tunnel about 1500 feet in length will be run to tap the gravel channel. Three hundred feet of the proposed distance has already been run.

Work on the Gold mine at Central Hill, which was recently bonded to F. Schaal, is being pushed with activity. A three-stamp mill, tramway and all the necessary buildings have been erected. A tunnel has been run 200 feet, very rich gravel struck, and the outlook is very encouraging.

THE MOSER MINE.—*Chronicle*: Few of our mining men realize the fact that we have a "big mine," in this property. Main tunnel on lead is now 400 feet north of south end and shows a strong lead running cross the formation, or country rock, and averaging five feet thick. About 100 feet apart the tunnel is provided with up-raises each with substantial chutes, in which up-raises three lines of tunnels are run, all being securely timbered with "square sets." The workings show that none but skilled miners have been employed, and, judging from outside appearances, one can see that the manager understands his business. The mine is provided with a first-class eight-stamp mill, Tulloch concentrators, Challenge feeders, Dodge rock breaker, etc., all in good order, and is kept steadily running under the able management of that veteran millman, George Ward. Rock is supplied by the foreman of the mine, Wm. H. Currow, a practical miner and a man of good judgment.

To the Superintendent, Wood T. Harris, Esq., is due the success of the company.

El Dorado.

TO DEVELOP MINES.—*Democrat*: It is reported that Alvinza Hayward, the successful mining man and one of the owners of the Oro Fino mine, contemplates opening and developing the mining property owned by him near Indian Diggins, this county, at an estimated cost of \$75,000. Some of the best mines in El Dorado county are to be found in that district, and should this gentleman, with large experience and almost unlimited capital, open up such an enterprise this spring, Indian Diggins would experience a revival of the prosperity of early days.

Nevada.

GRANITE HILL MINE.—*Telegraph*: The Granite Hill mine is now looking just about as well as it was expected to look at the depth to which it has attained. The shaft is still going down and the ledge is widening as depth is attained.

EAGLE BIRD MINE.—*Telegraph*: There is quite an important strike in the Eagle Bird mine. It is stated that a two-foot ledge has been found in the 700-foot level, and that the mine is looking well wherever the drifts are being run. The shaft is being sunk and soon the 800 level will be reached.

FROZEN UP.—*Herald*, Jan. 8: The weather is moderating, much to the relief of the miners. During the past three or four days upward of a dozen mines in this district have been compelled to suspend work or in some cases to hang up their stamps. Several mines resumed work this morning. Nearly every mine in this district uses water power, and the weather has been so cold that the ditches froze from the bottom up, making it impossible to clear them in any way. All that could be done was to wait for a general thaw. In the mills the water was too cold for the concentrators, and the only thing to do was to hang up the stamps and quit.

Col. Davis of the Providence says that before another winter he will have a hot-water tank for his mill, such as is used in the Northern States. B. N. Shoecraft of the Nevada City also contemplates putting in some kind of improved heating apparatus.

BONDED A MINE.—*Union*, Jan. 16: F. W. Spencer and A. P. Hodges have secured an interest in the Comet mine, in this district, which Peter McAusland has under bond. The *Herald* says they will proceed to develop the mine at once, and men will be put to work on it to-day.

DAM WASHED AWAY.—*Telegraph*, Jan. 15: The dam in Wolf creek, just above the Granite Hill mine, was washed away under the terrible pressure of water this morning. Supt. Stephen Fowler with his men were working in water up to their waists to turn the water into the ditch in order to keep things running at the mine. The Granite Hill is all right!

TO START UP.—*Union*, Jan. 12: Superintendent Tregidgo last night informed a reporter that work would commence to-day in "pumping out" the Hudson Bay mine. When it is free of water the mine will be opened up as much as possible and several men be put to work.

SUITS COMMENCED.—*Transcript*, Jan. 15: An important suit has been commenced in the Superior Court of this county by Ed Commins, Martin Ford, et al., against Con Reilly, the Allison Ranch Mining Company, et al. The defendants have been digging a ditch to convey water to the Allison Ranch mine, which will start up again in the spring, and it appears from the complaint the defendants have been dumping debris from the ditch on to the ground of the Franklin Company, owned by plaintiffs. The suit is to restrain the defendants from continuing in their work and to recover \$1000 damages and costs.

CENTENNIAL GRAVEL.—*Enterprise*: A box of gravel from the recent new and important strike in the Centennial mine has been received by Secretary James, at the Gold Hill assay office. It is the regular old blue lead gravel of Nevada county, free washing, and pans out very satisfactorily, yielding bright, heavy gold. So far has fallen to the depth of two or three feet, preventing sluice washing for the present; but as early as possible in the spring—April or sooner—sluices will be brought effectively and lucratively to bear on the subject of future dividends.

Placer.

MINE PURCHASED.—*Grass Valley Union*: A. L. Begbie, superintendent of the Spanish mine, Nevada City, on Saturday purchased the Hathaway quartz mine in Placer county for Colgate & Co. of New York. There are 100 men employed in the mine. Mr. Begbie will continue to superintend the Spanish mine, and will also have charge of the Hathaway.

Plumas.

WORK ON A DAM.—*National Bulletin*: Work on the restraining dam to be erected across Rock creek, below the Hungarian Hill properties owned by the Plumas Imperial Mining Co., was begun Tuesday under the superintendency of F. E. Thomas, and will be pushed to completion. At the present time, not more than ten men are employed, but more may be put to work later on. Col. Day is expected to return from South Dakota in a few days, when greater activity with reference to the Plumas Imperial may be expected.

San Bernardino.

GREAT PROGRESS.—*Vanderbilt Shaft*, Jan. 12: The past week has been one in which greater progress has been made than in any other three weeks since the first location was made here. There have been, perhaps, periods of more feverish excitement over finds, and more people could be seen on the streets. Such periods have not benefited the place. The reaction that has always followed has been hurtful to Vanderbilt in the extreme. In the past week, however, much has been accomplished.

Immediately upon the arrival of his mill, and upon the arrival of Mr. Stanley and Mr. Rich, A. G. Campbell began work in earnest on the preparations for the erection of his mill. A large crew of men were put to work grading for the mill, in consequence of which the work is all done, and the foundations for the battery and engine will soon be completed. The machinery and lumber are nearly all on the ground. As soon as possible, the mill will be erected and in working order. The water for the mill will be supplied by three wells, and will flow through a 33-inch hydraulic mining pipe into a sump below the mill, from which it will be pumped as needed. This will necessitate the laying of 5000 feet of pipe.

At the Boomerang, the new steam hoist will

soon be in running order. The ore now being taken from this mine looks remarkably well. Altogether, matters are as satisfactory at Campbells as they could well be.

Things are assuming a very cheerful aspect about the property of the Vanderbilt Mining and Milling Company, also. On Monday morning the force was increased, the new men commencing the grading for the mill, which will, without doubt, arrive here by February 1st. The mill will be fitted for 20 stamps, although only 10 stamps will be put in at first. The Monday morning train brought in Mr. A. Smith of Denver, who is an able millman. He will have charge of the erection of the mill.

This week has not been without excitement. Friday night, about ten o'clock, a blast in the east drift, on the 50-foot level of the Gold Bronze, opened up a cave of crystallized quartz bearing free gold. It being remarkably rich in appearance, Mr. Saurbrey, the foreman, called Mr. Taggart down. Later Mr. Patton went also, and, as a result of the blast, the richest ore ever found here was taken out. It showed so much free gold that an excitement was raised immediately. The next morning every one looked at the rock and said it was very rich, which it was.

Shasta.

WATER SCARC.—*Democrat*, Jan. 10: The Hidden Treasure mine on Iron mountain has been compelled to hang up five stamps on account of the scarcity of water for motive power. They have discovered an immensely rich ore and put seven more men at work this week. The mine promises to become a large producer. The underground developments are a surprise to the owners.

The Minnesota-Janey & Co.—is running its ten stamps on high grade ore. It has about 200 tons piled upon the dump and in the bunkers. The output of this mine is about 40 tons a day, while the mill handles 30 tons. The concentrators are working satisfactorily.

The property being worked by Mr. Hartman near the Mad Ox mine, is showing a nice, clean four-foot vein of high grade free-milling.

Jim Hill has a fine bunch of ore on his claim at Lower Springs, and a milling test is soon to be made of 20 tons of this ore. Free gold is found disseminating all through the rock.

Messrs. Conner & Co. are pushing their development work on Salt creek, and a mill to work their ore will be in order soon.

Mining Engineer Mariansky and two Chicago gentlemen have been looking over the Quartz Hill property in Old Diggings this week. They have decided to erect a 50-stamp mill on the property at once. Old Diggings will be a busy camp this spring.

The recent test of the ores from the Bunker Hill property proved so highly satisfactory that a large plant will be erected at Middle creek in the spring for the reduction of ore on a large scale.

The bond on the John Dobelin property near Centerville expired Monday and Dobelin, after receiving several thousand dollars, again takes the property.

The property being worked by Messrs. Parsons & Co. on Orson gulch, is looking up favorably. They have sunk a shaft through sandstone and found a gravel deposit between the sand and slate. The sandstone strata was 60 feet thick. The shaft on the gravel runs on an incline of 45 degrees and has been sunk to a depth of 90 feet, where gold is being found in paying quantities. A steam pump handles the water easily and the old channel theory seems to be verified in this case.

Yuba.

MINES IN OPERATION.—*Telegraph*: At the present time Smartsville is more lively than it has been for many years. The surrounding country is well under cultivation and a large exhibit of citrus fruit and farm produce has been sent to the Midwinter Fair to let the inhabitants of this glorious State know that, although famed in the past for its minerals, it is fast coming to the front in agricultural and horticultural lines.

The Excelsior mine, which recently resumed operations under the supervision of the Debris Commissioners, has had a cleanup, and a very satisfactory one. This mine successfully restrains its debris, and it seems an outrage that it was ever closed down. The Excelsior gives employment to about 30 men at the present time.

Paddy Campbell is working his hydraulic mine, about 28 men being employed. This mine is known to be rich.

NEVADA.

Washoe District.

THE RULE DRIFT.—*Enterprise*: The drift is being pushed ahead at the rate of over 60 feet a week in the present direction, but what course will be followed after it nears the Best & Belcher north line is only known to Mr. Rule, who is confident of treating the shareholders to a surprise party before the expiration of 90 days.

SUMMARY OF COMSTOCK OPERATIONS.—The official report for the past week of Superintendent Lyman of the Consolidated California & Virginia mine says: "1650 level.—In our workings in and from the drift run north from the foot of the npraise which was carried up from sill floor of this level, we have extracted some ore of average quality. The drift running north from the crosscut run east from the drift run north from the winze (down 52 feet) has been advanced a total distance of 134 feet; face in porphyry, clay and quartz carrying a low assay value. From the drift run north from the winze (down 52 feet), at a point 126 feet north from the winze and opposite the west crosscut, an east crosscut was started and has been advanced 15 feet in porphyry, clay and quartz of low assay value. From the vicinity of the winze (down 20 feet) we have extracted ore of fair quality. We

have extracted in all during the week 72 carloads of ore—about 70 tons—averaging \$42.19 per ton, the greater portion of which came from the winze—20 feet down. The southwest drift (the Rule drift) from the 1000-foot station of the Con. California shaft has been advanced during the week 66 feet; total length, 331 feet. It has shown a softer formation, consisting in the largest proportion of quartz which carries an assay value of \$2 to \$6 per ton; the face is in porphyry, clay and quartz averaging from \$2 to \$4 per ton."

The official report from the Best & Belcher mine is as follows: "200 level.—The north drift which was started in west crosscut No. 3, 175 feet from the main north drift, has been extended 15 feet, passing through porphyry and quartz showing some value; total length, 108 feet. 900 level.—The east crosscut on the north line has been advanced 20 feet; total length, 273 feet; face in porphyry."

Following is a summary of the official news from the other Comstock mines: In the Ophir, on the 1465 level, the north drift from the west crosscut is in 54 feet, the face being in a porphyry formation. Have commenced repairing the Central tunnel for the purpose of prospecting therefrom when the repairs are completed. In the Mexican the west crosscut from the south drift from the top of the npraise, 45 feet above the 1465 level, is in 21 feet, the face being in porphyry and clay. On the 900 level of the Union Shaft the joint Union Con. and Sierra Nevada north drift from the west drift is in 360 feet, and the face is in hard porphyry. On Cedar Hill the Sierra Nevada intermediate south drift is in 364 feet. The face is in porphyry. On the 420 level of this A. Des the north drift from the west crosscut was advanced 9 feet, continuing in ore of good assay value.

In the Hale & Norcross mine they continue to stop ore from the winzes below the 1300 level, and extracted during the week 16 cars of ore, assaying \$47.07 per ton per car sample, and five cars of ore, average assay per car sample \$20.31 per ton. In the Chollar mine they are making repairs in main shaft below 850 level. Extracted and sent to the mill the past week 132 tons of ore from the 100 level. Milled during the week, 150 tons. On hand at mill, 94 tons. Average battery assays, \$22.39; average car-sample assays, \$27.95. In the Potosi mine the east crosscut, 300 feet south of north line, 750 level, is out 56 feet; face in soft porphyry. During the week have been making repairs on the 250, 450 and 930 levels. On the 820-foot level of the Ward shaft the west drift from the station is out 445 feet from the shaft; face in porphyry. Repairs to the old Alpha shaft are still being made. In the Kautuck Con. mine, on the 1100 level, the south drift in the east ledge is in 47 feet; face in low-grade ore. The npraise from the west crosscut is up 40 feet; top in fair-grade ore. In the Occidental mine they continue to extract from the west ledge above the 400 level 8 tons of ore per week of the average assay value of \$44 per ton. The west crosscut from 2 npraise, started at a point 75 feet below the 300 level, is now in 186 feet, and continues in porphyry with seams of quartz.

IDAHO.

WHY THE MINES CLOSE.—A Wallace special, Jan. 8th, says: The increasing cold weather of the past few days has temporarily shut down the Union and Frisco concentrators, throwing 50 to 75 men out of employment for the time being.

The Tiger mine at Burke shut down Saturday. At the time of the shut down 85 men found employment there. There are now 23 men working under contract, and about seven or eight will be employed in addition, so that the cessation of work is not absolute, but at least one-third of the working force of the mine will be retained. F. R. Culbertson, the superintendent of the mine, said: "We are shutting the mine down simply because we cannot make any money at the present prices of lead and silver, coupled with the increased expenses incident to the winter season. We have shut down until such a time as there is an improvement in the prices of the metals or a reduction in the working expenses."

BOUGHT A MINE.—The Flannigan gold mine, located six miles from Boise, has been sold to Portland parties represented by Harry Raymond. The price is not made public. The property is believed to be valuable. It is the intention of the purchasers to put on a Crawford mill at once and it is understood that if it proves successful a more extensive plant will be put in to handle the ore, similar to those of the Flannigan mines.

OREGON.

NEW MILL.—*Jacksonville Times*, Jan. 11: A new five-stamp mill is expected soon for the Shorty mining claim in Ashland district. The mill-site is on Bear gulch, within 200 feet of the present dump. The mine has been paying under rather adverse circumstances, as the ore has been hauled several miles by wagon to be milled.

MACHINERY EN ROUTE.—*Baker City Democrat*, Jan. 8: Mr. O. B. Hardy, the lessee and manager of the Phoenix mine, who is in the city, has received word from the East of the shipment of a carload of machinery for the mill plant now in course of erection at the Phoenix, and Mr. Hardy expects its arrival in Baker City in a few days, at which time the machinery will be forwarded by rail and team to the mine. Mr. Hardy expects the mill, a ten-stamp, in operation on the mine by February 1st or thereabouts. The latest reports received from the Phoenix are of a very encouraging nature, and Mr. Hardy is in the best of spirits over his flattering prospects.

STEKE AT SPAETA.—*Baker City Democrat*, Jan. 8: Senator Wright arrived from Sparta by last evening's stage and brings the reliable news that in the Ollie Woodman mine an ore body

has been exposed at a depth of 120 feet which is four feet wide and will average \$100 in gold to the ton.

BIG MINING DEAL.—*Jacksonville Times*: J. M. Sparham & Co., mining brokers of Seattle, Wash., have purchased 600 acres of mining ground in Footh Creek district. This includes all of what is known as the "Old Cement Channel," and is supposed to be very rich. The land was owned by Messrs. Baily, McKnight, Goldworthy, Swacker and Brooks. The parties have executed a deed in trust to the company, conditioned that if the purchase price is not paid on or before June 28th the land reverts to the original owners. Sparham & Co., who have plenty of means, intend to thoroughly prospect the ground.

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey & Co., Pioneer Patent Solicitors for Pacific Coast.

- FOR THE WEEK ENDING JAN. 2, 1894.
- 512,089.—DEMINATING MACHINE—Fred Baugert, S. F.
511,995.—WATER PURIFIER—C. F. Buckley, S. F.
511,933.—BOX FASTENER—W. T. Collier, Los Angeles, Cal.
512,161.—STREET SWEEPER—M. Crawford, Jr., Stockton, Cal.
511,983.—TELEPHONE ROOSTER—A. R. Duperré, S. F.
511,940.—PISTON—M. W. Fairbanks, Boonville, Cal.
511,942.—INSOLV.—W. W. Glavin, S. F.
512,021.—WAITING METALLIC SHEETS—J. Gould, Jr., Oakland, Cal.
511,952.—CAR PUMPER—J. Hubash, S. F.
512,110.—SULKY HARROW—T. J. Hubbell, Santa Cruz, Cal.
511,954.—STEAM ENGINE—B. Jackson, S. F.
511,934.—DISPLAY CASE—John Kahn, Los Angeles, Cal.
511,902.—WICK TRIMMER—J. W. Lawson, San Bernardino, Cal.
511,985.—CAR OPENER—T. B. Lepley, La Grande, Or.
512,043.—PIANO—H. Miller, Stockton, Cal.
512,253.—HOISTING MACHINE—G. C. Murray, Seattle, Wash.
511,966.—HAIR CLIPPER—O. Olsen, Oakland, Cal.
511,968.—STEAM BOILER—D. Risley, Colfax, Wash.
512,233.—BRACE—F. M. Speece, S. F.
512,063.—CAR COUPLING—C. B. & T. D. Stewart, Walla Walla, Wash.
511,977.—SEWING MACHINE—Mary Tobener, Gold Hill, Nev.
- FOR THE WEEK ENDING JAN. 9, 1894.
- 512,593.—GATE—J. W. Bennett, Woodford, Cal.
512,269.—SHIP'S LOG—F. A. Ebbop, S. F.
512,600.—SAWING MACHINE—F. D. Butzer, Cosmopolis, Wash.
512,431.—VENEERING STONE—Chatain & Giletti, S. F.
512,543.—MOP HEAD—R. Froberg, S. F.
512,237.—BEST HARVESTER—W. K. Gird, Chico, Cal.
512,440.—VAULT COVER—H. Hauslein, S. F.
512,294.—GATE—Hopkins & Simons, Blalock, Or.
512,616.—WINE PRESS—Jas. Kelly, S. F.
512,659.—CARPET TACKER—D. H. McFalls, Ellensburg, Wash.
512,652.—INK PUMP—O. M. Moore, Huguana, Wash.
512,447.—TYPE HOLDER—A. E. Newby, San Jose, Cal.
512,624.—WINDOW SHADE—Z. Phinard, Portland, Or.
512,662.—MOLD—E. L. Ransome, Oakland, Cal.
512,663.—CONCRETE MIXER—E. L. Ransome, Oakland, Cal.
512,685.—TARLER—G. K. Russell, San Diego, Cal.
512,439.—LIQUID AGITATOR, ETC.—A. H. & T. A. Schluster, Oakland, Cal.
512,454.—TELEPHONE TIME INDICATOR—C. Stever, San Jose, Cal.
512,411.—ENGINE GOVERNOR—I. F. Thompson, S. F.

NOTE.—Copies of U. S. and Foreign patents furnished by Dewey & Co. in the shortest time possible (by mail for telegraphic order). American and Foreign patents obtained, and general patent business for Pacific Coast inventors transacted with perfect security, at reasonable rates, and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

APPARATUS FOR AGITATING AND DISCHARGING LIQUIDS.—A. H. and T. A. Schluster, Oakland, Cal. No. 512,489. Dated January 9, 1894. The object of this invention is to provide an apparatus which is especially designed for containing milk or other liquids, the constituents of which are inclined to separate from each other when the liquid remains for a considerable time in a quiescent state, as in the case of cream rising on the surface of the milk, and to keep the liquid agitated so as to prevent such separation, to protect the surface from dust or from atmospheric influences, and to provide a convenient means for drawing off the liquid from time to time and simultaneously agitating it. In carrying out this invention, an exterior chamber is employed having an interior fitting within it, the outer chamber being open at the top while the inner one is open at the bottom and closed at the top, and has an opening made with a screw cap to close it. A filling passage is made upon one side of this chamber, and a discharge cock is fixed in one side of the outer chamber. The barrel of the cock is so curved as to cause a siphonic action when it is open, and as the liquid flows out through this cock air is drawn in through the filling passage, and, rising up through the liquid in bubbles, keeps it constantly agitated.

MOP HEAD.—Richard Froberg, S. F. No. 512,543. This invention consists of a mop-head having a transverse jaw with a socket by which it is secured to the handle and sharp-pointed spurs projecting from the face of the jaw. In conjunction with this, and hinged to a bracket at one end of this transverse bar, is an opposing bar having pointed spurs projecting so as to interlock with those of the first bar when the second one is closed. The second bar has a spring actuated locking device at the end which holds it fast when closed, but it is easily unclamped to allow the parts of the head to be separated and the old material removed and new introduced when necessary.

MANUFACTURE OF ARTIFICIAL GRANITE AND VENEERING STONE.—E. Chatain and S. Giletti, S. F. No. 512,431. This invention relates to the manufacture of artificial granite and veneer-

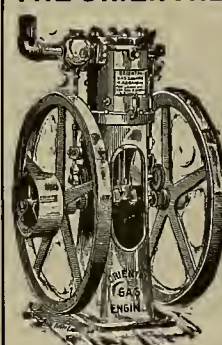
ing stone. It consists in first tamping a layer of the body forming material in a mold, one inner vertical wall of which is formed by a vertically movable slide, then removing the slide and tamping a layer of the facing material in the space formed by the lower end of the slide, then replacing the slide with its lower end resting on the tamped facing layer, and tamping the second body forming layer and again removing the slide and tamping the second facing layer, thus continuing the formation of the body and facing material by successive steps until the face block of the desired thickness has been provided. This enables the manufacturer to make a body forming material of cheap substances and a facing of more expensive material which will show any kind of finish desired, the two being united while in a plastic condition so that the block becomes essentially homogeneous when it is set.

ENGINE GOVERNOR.—I. F. Thompson, San Francisco, Cal., assignor of one-half to W. L. Palmer, No. 512,411. Dated Jan. 9, 1894. This invention relates to a differential spring governor for steam engines, which is applicable either to control a valve by which steam is admitted to the engine valve chambers or to directly actuate the cut-off mechanism of any well-known type of valve. It consists of a fulcrum lever, one arm of which connects it with the valve or cut-off stem and the other with a collar sliding upon the governor spindle. The governor balls or weights have short arms connecting with a bar fixed to and rotating with the spindle, and other arms extending outwardly on the opposite side and connecting with the bar which is slidable upon the spindle and which actuates the movable collar. The angle formed by the levers which extend out from the opposite side of the balls or weights are internal angles, so that as the balls are thrown outward, these balls are brought more nearly into a straight line with each other. A compression spring acts to return the parts when the centrifugal force is reduced.

TIME INDICATOR ATTACHMENT FOR TELEPHONES.—Cbas. Stever, San Jose, Cal. No. 512,454. This invention consists of an indicator electrically connected with a telephone and provided with a mechanism which is set in operation by the connection of two telephones whereby a response is returned over the telephone wire, the object being to provide for an automatic response from the telephone which is called during the absence of the occupant of the office. The indicator is set for the time at which the operator will return to the office and remains normally inactive, but when the telephone to which the indicator is attached is connected through the central office and the distant subscriber calls, the indicator is set in operation and makes a response which indicates the absence of the person and the time at which he will return.

HOLDER PLATE FOR TYPE.—A. E. Newby, San Jose, Cal. No. 512,447. This invention relates to that class of holders for receiving and confining several independent parts, such as letters, dies, designs, cuts and other characters, but it is especially intended for the holding of removable and interchangeable type whereby they may be combined in various relative positions as desired. The invention consists essentially of a peculiarly constructed bed-plate, with an overlying clamping frame adapted to hold the type or other characters to the bed-plate, and its use saves the time and expense of separate dies for each mark or label to be printed.

THE ORIENTAL GAS ENGINE



IS THE BEST, because it combines simplicity of construction with power and economy in space. It can be run with natural or manufactured gas or gasoline at a cost of 20 to 25 cents per horse power per day.

It can be used for pumping purposes, as well as for all purposes where a perfect engine is required, with the advantage of lessening the risk of explosion. No licensed engineer at a high salary needed to operate it. Send for circular and prices if a good safe engine is what you need.

The Oriental Launch is Perfection.
M. A. GRAHAM,
Inventor and Manufacturer,
105 BEAL STREET, SAN FRANCISCO.

The Explorers' and Assayers' Companion.

A Third Edition of selected portions of the "Explorers', Miners', and Metallurgists' Companion."

A practical exposition of the various departments of Geology, Exploration, Mining, Engineering, Assaying, and Metallurgy.

Price, \$6.00, post-paid. Sold by DEWEY PUBLISHING CO., Publishers, 220 Market St., San Francisco.

By J. S. PHILLIPS, M. E.
The work is divided into four parts—Rocks, Veins, Testing and Assaying. The geological chapters are intended to give miners a practical idea of the various formations. The chapters on mineral veins are derived from long observation, and the section on exploration has been carefully considered. All that relates to discrimination and assay of minerals has been kept as free from formulae as possible. The work is written for practical men, and all the explanations and descriptions are clear and to the point. It is so prepared that it is useful to uneducated men as well as scientists.

Market Reports.

The Markets.

SAN FRANCISCO, Jan. 18, 1894.

The silver market during the week has shown practically no change. Lead, notwithstanding the falling off in production, has shown no improvement. The tariff agitation seems to be the main depressing influence. Copper has been weaker. James Lewis & Sons, London, in their circular Jan. 2, say: "Nearly all the contracts for refined copper at low prices, made by American producers and smelters for delivery during 1893, are now completed. The future of values now mainly depends upon whether time will be given for the absorption by consumers of the large supplies sent to the Continent—chiefly to Germany, those to England and France being already well absorbed."

NEW YORK, Jan. 18.—Following are the closing prices for the week:

	Silver in	Copper	Lead	Tin.
Thursday	68 1/2	10 1/2	3 10	20 50
Friday	68 1/2	10 00	3 10	20 20
Saturday	68 1/2	10 00	3 10	20 20
Monday	68 1/2	10 00	3 10	20 15
Tuesday	69	10 00	3 10	20 20
Wednesday	69	10 00	3 10	20 10

San Francisco Metal and Coal Market.

ANTIMONY.	QUICKSILVER.
For Id. @ 13	Home trade, pr. @ 30 00 @ —
BORAX.	STEEL.
Refined, in car lots @ 7 1/2	English, lb. @ 20
Powdered, do. @ 7 1/2	Oregon tool. @ 20
Concentrated, do. @ 7 1/2	Bit's Diam' tool @ 15
All grades shipped at advance.	Pick & Hammer. @ 10
COPPER.	Machine. @ 5
Bolt, 23 @	Toe Oak. @ 4 1/2
Bleaching, 23 @	PIG TIN.
Ingot, jobbing, 20 @	Spot @ 21 1/2 @ 22
Do, wholesale, 16 @	COAL.
IRON.	SPOT PRIME YARD—PER TON.
Bar, base, 20 @	Wellington. @ 8 00
Norway, base, 41 @	Greta. @ 7 50
PIC IRON.	Nansimo. @ 6 50
Spot.	Gilman. @ 6 00
Eglinton 10 ton. 18 00	Seattle. @ 6 50
Glenbrook. 18 00	Ocean Bay. @ 6 50
Sh. Bolt, No. 1. 50 @	Oannel. @ 9 00
Shots No. 1. 50 @	Egg, hard. @ 12 00
Putet Sound. 50 @	Wallend. @ 7 25
Olay Lane White. 19 00	Scott's Split. @ 8 00
Langdon. 22 50	Scotch Split. @ 7 50
Gartaherrie. 22 50	Brymbo. @ 7 50
Barrow. 22 50	West Hartley. @ 7 50
Carroll. 22 50	TO LOAD—PER TON.
LEAD.	Australian. @ 8 00
Drop, sizes smaller than	Liverpool Steam. @ 8 75
B, 1/2 bag of 25 lbs. 17 50	Booth Split. @ 7 00
Do, B and larger sizes.	Cardiff. @ 7 00
1/2 bag of 25 lbs. 2 00	Lehigh Lump. @ 10 00
Buck, Balls and Chilled	Cumberland. @ 8 50
Do, 1/2 bag of 25 lbs. 2 00	Egg, hard. @ 9 00
	West Hartley. @ 7 50
	OK.
	Do, English, to load. @ 8 00 @ 10 00
	Do, spot, in bulk. @ 12 00
	Do, in sacks. @ 14 00
	Cumberland. @ 9 00

Mining Share Market.

SAN FRANCISCO, Jan. 18, 1894.

The Comstock market was subject to small fluctuations during the past week, but business was fairly remunerative to the commission brokers.

Monday's business opened dull. Tuesday, Consolidated California & Virginia sold as low as \$3.20, Best & Belcher \$1.90 and Ophir \$1.40, with a smaller cut in the prices of the other stocks. The direct wires to Virginia City prostrated by Sunday's storm were not in working order, but dispatches were received by way of Reno, Helena and Portland, with less than an hour's delay in transmission, and brokers who have agencies on the Comstock were active sellers for a time. At 10:30 A. M. a sharp break in prices caused many purchases to be made for account of dealers who were short on the market, and this imparted a steadier tone to the market, and prices had a small recovery.

Advices received Tuesday reported the southwest or "Rule" drift on the 1000-foot level of the Consolidated California & Virginia mine to be about 370 feet from the station of the old Con. Virginia shaft, with the face in a soft formation composed of porphyry, clay and streaks of quartz.

The market closed in a weak condition Tuesday afternoon, with sales of Con. California and Virginia at \$3.25, Best & Belcher at \$1.90, Ophir at \$1.40, and prices 5 and 10 cents lower for most of the others as compared with what they sold at on the regular session. There was an active volume of sales, Wednesday morning the market opened much duller, but prices were slightly steadier under a demand for cash stock from Pacific Board traders who sold short yesterday and had to make deliveries before noon to-day. The regular wires to Virginia City were up and working well Wednesday morning, but they brought no news of any changes in the condition of the mines. To-day there are no changes of note.

Board Sales of Mining Stocks.

S. F. Stock Board.

THURSDAY, January 18, 1894.

9:30 A. M. session.

200 Alta.	20000 Mexican.	850
550 B & B.	20000 Ophir.	1 60
100 Bulwer.	15000 Justice.	2 00
50 Oca. Cal. & Va.	34500 Mexican.	1 05
400 34500 Sierra Nevada.	35000 Union.	750
100 Crown Point.	220 P. M. session.	
100 Andes.	20000 Mexican.	1 10
100 Best & Belcher.	15000 Ophir.	1 60
100 Bulwer.	15000 Justice.	2 00
200 Con. Cal. & Va.	34500 Mexican.	1 05
50 34500 Sierra Nevada.	35000 Union.	750
100 Crown Point.	220 P. M. session.	
100 Andes.	20000 Mexican.	1 10
100 Best & Belcher.	15000 Ophir.	1 60
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100 Crown Point.	220 P. M. session.	
100 Andes.	20000 Mexican.	1 10
100 Best & Belcher.	15000 Ophir.	1 60
100 Bulwer.	15000 Justice.	2 00
200 Con. Cal. & Va.	34500 Mexican.	1 05
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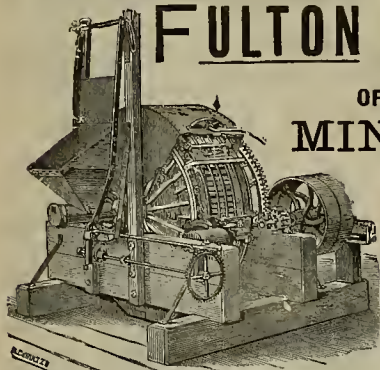
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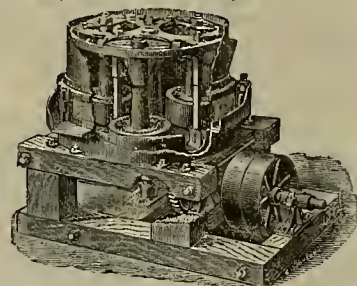
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MINING AND SCIENTIFIC PRESS.

An Illustrated Journal of Mining, Mechanics and Popular Science.

VOLUME LXVIII.
Number 4.

SAN FRANCISCO, SATURDAY, JANUARY 27, 1894.

Three Dollars per Annum
SINGLE COPIES, 10 CENTS.

California and Colorado.

California easily maintained its lead during 1893 as the chief gold-producer of the United States. It might appear from the figures of Wells, Fargo & Co., printed in the Press last week, that Colorado is a close second, and perhaps in time destined to pass the present leader. But it is not at all probable that the Golden State will lose its prestige. The figures given for the two States by Wells, Fargo & Co. are as follows:

California—Gold dust and bullion by express, \$9,697,036; gold dust and bullion by other conveyances, \$1,475,000; silver bullion by express, \$257,005; ores and base bullion by freight, \$1,667,907; total, \$13,096,948.

Colorado—Gold dust and bullion by express, \$7,229,643; silver bullion by express, \$16,369,257; ores and base bullion by freight, \$3,878,635; total, \$27,477,535.

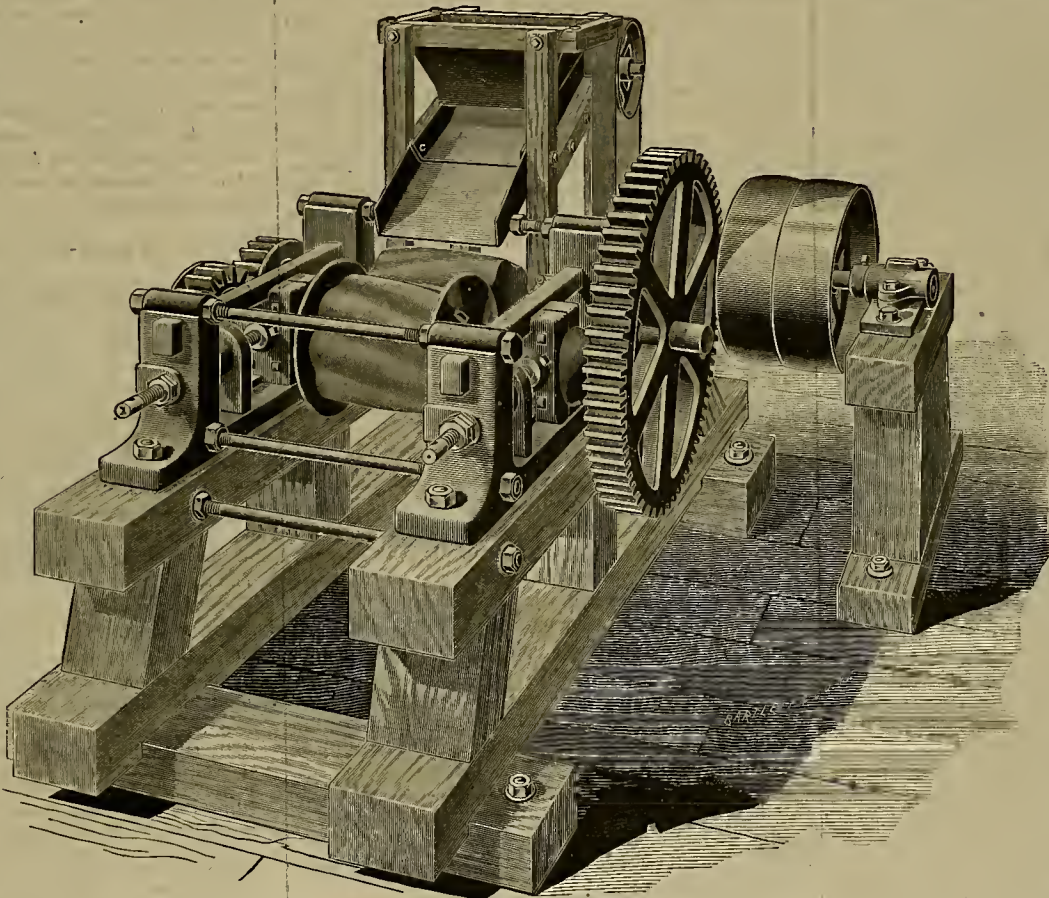
It is fair to say that practically the whole output of California, represented in the above figures, is gold, except the \$257,005 silver. The item "ores and base bullion by freight" was made up of sulphurets and highly sulphuretted ores forwarded to Selby's and other smelters for treatment. In the silver States, however, this item contains little gold, but is made up of silver-lead ores, argentiferous copper ores containing gold and silver, lead ores proper and high-grade silver ores. The Colorado gold output, therefore, is fully represented by the statement that its output was \$7,229,643, while all in California is gold except the one silver item of \$257,005. The California output is then, according to Wells-Fargo's estimates, \$12,839,943.

It is to be borne in mind also that the Wells-Fargo estimates in this State are below the Mint estimate; while for Colorado they are quite equal. It is not necessary here to explain the reasons. It is by no means certain either that the system of allotment of returns to the various States and Territories is exact and that Colorado has not received more than its share. Probably it has. It is well known that ores from all over the coast are shipped to the great smelters of Colorado. Some of the smelters keep their returns by States and Territories; some do not. It is therefore not possible always to state what ores belong to Colorado and what do not.

Colorado made an excellent showing in 1893 considering all the circumstances; but, as a gold producer, it is yet several laps behind California.

THE House Ways and Means Committee some time ago added a proviso to that portion of the free list concerning petroleum, imposing a present duty upon all oil imported from countries which impose a duty on our product. The Democrats of the Ways and Means Committee, on Wednesday, agreed to strike this off and put petroleum on the free

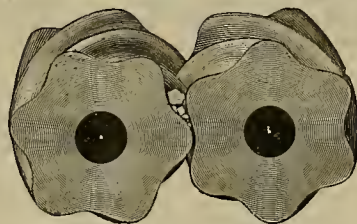
list, claiming that the opposition to it had been worked up by the Standard Oil Company. Representatives of the oil interests at Washington are fighting it on the ground that it is done in the interests of the Peruvian oil producers and assert that a line of tank steamers is being built to carry Peruvian oil to San Francisco, and that contracts have been made to deliver oil in San Francisco at 75 cents per barrel less than the present price. They state that



WALL'S IMPROVED CRUSHING ROLLS.

this change has been made in the interest of J. W. Grace & Co., of which firm ex-Mayor Grace of New York, leader of the "Anti-Snapper" convention, is a partner.

MONTANA will have a very interesting exhibit at the Midwinter Fair. Two carloads of ores and gems are on



THE WALL SHELLS.

their way here. Conspicuous features will be rubies and sapphires, the Ada Rehan silver statue, gold, silver and copper ores. It is designed to show copper in every stage of its development, from the time it leaves the mines until it is cast into bars. Montana is the greatest copper State in the Union, and this feature of the exhibit will doubtless be valuable.

The Wall Improved Crushing Rolls.

The Wall rolls differ from the "Cornish" and other roller crushers in common use, chiefly in the novel construction and arrangement of the crushing faces, which consist of series of parallel corrugations, extending across the face of the shells, either parallel or inclined to their axis, the corrugations being rounded or curved with such

proportions that, when intermeshed and rotated, every portion of the surface of each will press equally upon the counterparts of the opposite roller; and, being held firmly in position by suitable steel gear, slipping of the crushing faces upon each other or upon the material being crushed is said to be rendered impossible.

By reference to the smaller illustration, it will be seen that the meeting or crushing faces present at all times overlapping curved surfaces, between which the material is firmly held, and crushed by almost direct pressure, thus avoiding "grinding" or uneven and rapid wear of the face of the shell, and the consequent destruction of the ores by the production of refractory "slimes." This feature renders the crusher of value for the preparation of ores for concentration or lixiviation and in the crushing of high-grade ores and matte for sampling or transportation.

One of the crushers placed to receive and crush the product of the rock-breaker in the common stamp mill, it is claimed, will add 20 per cent to the capacity of


a battery of 60 stamps. The Parke & Lacy Co. are agents.

AFTER 27 years of continuous litigation the famous land title case of Isaac E. Davis and Henry Cowell against the California Powder Company has reached an end. This information was conveyed to the interested parties in this city by recent telegrams from Washington announcing that the Supreme Court had virtually decided in favor of Henry Cowell, the surviving plaintiff. The decision involves the title to several hundred acres of land on the east bank of the San Lorenzo river, in Santa Cruz county. Its chief value to the powder company lay in the fact that it adjoined their other property.

THE River Improvement delegation of six has already gone to Washington. If hoards of county supervisors can see their way clear to pay a large part of their expenses, there is no good reason why like contributions cannot be made for the miners' delegation.

THE Virginia City Enterprise declares that the Congressional "act suspending hydraulic mining is now conceded to have been the most unjust ever passed by Congress." Congress has a good deal to answer for, but it did not promulgate the Sawyer decision.

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San Francisco, January 27, 1894.

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Lower Wages in Future.

The claim is advanced by mine-owners in the silver regions that if wages had been \$2.50 to \$3 per day instead of \$3.50 and \$4, many of the idle mines would now be running, and the calamities which overwhelmed the industry in a great measure avoided. This is, of course, one of the big "ifs" that cannot be removed from the past history of the mines. The claim may or may not be well founded. But it is inevitable that reduction of wages occur in the future. Hard times are an irresistible weakening force, and, in our opinion, miners' unions will not be so well able to maintain wages as in the past. It is comparatively easy for the skilled laborer to dictate the terms of his employment when times are good, when mines are prosperous, and when a cessation of operations through labor or other troubles is a disaster an employer will ordinarily do much to avoid. But when an industry is prostrated; when the workmen must have bread, and when there are ten applications to one vacancy, the mine-owner can, within certain limits, pay what he pleases. At the present the necessities of the silver mine operators compel economical administration in all branches; the necessities of the miners will drive them to seek employment at almost any figure. It will not be very difficult under these circumstances for employer and employee to find a basis of mutual understanding. It will be found that a mine here and there is paying less than the scale, and then the miners will either themselves voluntarily reduce the scale, or it will come down by force of circumstances. Of course we do not expect to see a reduction in California.

It is not intended by these statements to advocate either reduction of wages or retention at the present rate, but simply to point out the situation and the certain result. There is scarcely a branch of industry in which less wages are not now paid than two years ago, and there is no reason why silver mining shall prove an exception to the rule.

It is desired by the California Miners' Association to raise a sum of money sufficient to send to Washington two delegates whose mission it shall be to explain to and urge upon Congress the association bill for the regulation of mining; and, likewise, to secure an appropriation for the construction of a restraining dam or dams in accordance with the recommendation of government engineers. For the latter purpose, it will be remembered, the State has already made a contingent appropriation of \$250,000. The funds of the Miners' Association are low, and it will be necessary to call on friends of the movement. Various boards of county supervisors have been asked for an appropriation of \$300 each (Nevada for \$500), and it is to be hoped they will respond promptly. The importance to

California of the measures which the delegation shall urge are very fully appreciated, and it ought to be necessary only to mention that the money is needed to call forth a ready and generous response from all interested.

The Quicksilver Tariff.

The Wilson tariff bill proposes to remove the specific duty of ten cents per pound on quicksilver and place it on the free list. Probably no single industry in California is more deeply concerned in the maintenance of adequate protection, or will be more seriously injured if brought directly in competition with the foreign product. It is well known that practically all the quicksilver of the United States is produced in this State; that the total investment of capital is in the neighborhood of \$30,000,000; that several thousand laborers are dependent upon the industry for a livelihood; that great difficulties of a permanent nature are encountered in the operation of the mines; that little or no profit is now being returned to the owners; that the deposits are slowly being exhausted; that no new deposits yet uncovered have become large producers, and that the home product is in excess of the home consumption. On the other hand, the foreign output is double that of California, the deposits are enormously rich and the reserves heavy. Their control is in the hands of a great syndicate that regulates the output to suit the condition of the market, and the American markets, if thrown open, would be absolutely at the mercy of one great monopoly, the Rothschild syndicate, which controls the mines of Spain.

The conditions of quicksilver production are so unusual, and their disadvantages in this country so conspicuous, that it is very easy to point out the effect of a tariff policy which withdraws protection from an industry which barely thrives under present circumstances. The duty on quicksilver now amounts to \$7.65 per flask. It is absolutely the only influence which preserves the Eastern markets to the home product, and, not counting less freight rates, it is the only influence which preserves the Western market; in other words, it is not possible for the California article to pay freight across the continent and compete on the Atlantic seaboard on equal terms with the Spanish or Austrian product, and it is possible for the foreign article, if unrestricted by tariff duty, to supply the mines of the West and drive the California quicksilver from the field, simply because the cost of production is much cheaper. Why the cost of production is less we will show briefly:

The cinnabar deposit at Almaden (Spain) is the most perfect known. It consists of three parallel veins and fissures, about 100 feet equidistant, growing richer and wider as penetrated. The average percentage of metal per ton of ore is about ten per cent. It is necessary to raise from the mine only a very small per cent of waste (perhaps two or three per cent). Wages are (or were recently) as follows: Miners, ore chambers, 81 cents per day of six hours; masons, in quarries, \$1.03; timbermen, 55 cents; furnace men, 40 cents.

In California the deposits are persistently irregular. The average percentage of metal per ton of ore at the New Almaden is one per cent or less. The quantity of waste to be removed is very large. Unwearied prospecting is necessary. The wages in California averaged one year recently for all employees \$2.43 a day. Average number employed, 425; average time worked in the year, 290 days. At the smelting works the average earnings per day were about \$2.30.

In 1833-84 (an average year), the total amount of material taken from the mine was: From ore chambers, 17,575 tons; from barren ground, 1900 tons. Of the ore raised 17,101 tons were worked only, 456 tons being worthless. Tons of ore reduced, 18,465.57, yielding 45,765 flasks, or 9.485 per cent. The quantity of ore handled in the year to each worker was only 6.23 tons, while at New Almaden in all the mining departments there were only 425 persons employed for the extraction of 138,640 tons, or an average of 326 tons a year to each worker, more than fifty-two times as much per year as at Old Almaden.

The following tables are from official sources and are very instructive. The first shows the relative mining cost per ton of material (productive and non-productive) extracted from mines:

	Almaden, Spain.	New Almaden, California.
Excavations.....	\$3 60.3	\$1 63.6
Strengthening.....	1 42.4	15.8
Drainage.....	0 16.6	04
Lowering, hoisting and tramming.....	36.8	23.2
Surface.....	14.3	10.2
Management of machines.....	02.6	04
General expenses.....	1 50.4	15.4
Workshops.....	25.5	04.2
Supplies.....	\$7 30.9	\$2 45.4
	1 21.6	90.2
	\$8 52.4	\$3 35.6

The following table shows the cost of quicksilver per

flask, from the average for one year at Almaden, Spain, and New Almaden, California (1835):

	1833, Almaden.	1835, New Almaden.
Staff and office expenses.....	\$0 75	\$0 80.6
Excavations—mine expenses.....	1 62	10 47.6
Strengthening " ".....	06	99.6
Drainage.....	01	25.2
Tramming " ".....	29	1 57
General expenses.....	70	1 84.3
Supplies.....	56	5 75.5
Distillation and flasking quicksilver.....	1 92	3 49.9
Workshops.....	12	45.2
Sundry expenses.....	23	.....
Hospital and Chapel.....	07	.....
Pasture of Castles.....	07	.....
Unforeseen expenses.....	03	.....
Transportation by teams.....	.....	75.7
Totals.....	\$7 10	\$26 38.6

These figures show that in 1835 eight times the amount of material was extracted from the American mine than was taken from the Spanish mine in 1833, its production, however, averaging only 20 pounds of quicksilver per ton for that year, while the Spanish mine's production was 200 pounds per ton; that the average number of tons handled for each worker in the Spanish mine was only 6.23 tons, while at the American mine there was extracted over 63 tons per worker, or ten times the amount extracted in equal time; that the cost of production of the Spanish mine was 27-100 of that of the American mine. It costs no more to extract and reduce rich ore than poor, and were the American ores equal in richness to the Spanish, the production of the American mines would be ten times as great, and cost \$2.64 per flask.

It is true that production of quicksilver in California has greatly decreased; but consumption—owing to paralysis of the silver industry—has likewise fallen off, and the demand does not equal the supply. Prudent and economical methods and skillful management alone make it possible for the mines of California to be operated under present conditions. If their difficulties are aggravated by unwise tariff legislation there is but one thing to do, and that is to shut down. There can be no reasonable doubt that, when once idle, the American market will be in control of the Rothschilds syndicate, and the price will be fixed at its pleasure.

Twenty-Four Out of Forty.

Of the forty applications made to the Debris Commission, twenty-four have been passed on favorably. That is to say, twelve licenses have been granted, and, in addition, twelve sets of plans for that number of mines have been approved. This is a definite pledge by the Commission that as soon as the impounding works are erected in accordance with the plans, formal license will be granted. Of the remaining sixteen out of the total of forty, ten have just been advertised, or are being advertised, and are in process of consideration; three mines have not yet been visited because of inaccessibility, and three are awaiting further information.

The Press published, two weeks ago, a list of all the applications made to the Debris Commission, with licenses granted. In addition to the twelve licenses granted, the plans of the following twelve mines have been approved, and the Commission is awaiting construction of the necessary works, when license shall be granted:

Kelly Hill mine, Butte county.
 Omega mine, Nevada county.
 Brandy City mine, Sierra county.
 Illinois mine, Plumas county.
 Eureka mine, Sierra county.
 Craycroft mine, Sierra county.
 Excelsior mine, Sierra county.
 Spanish Ranch mine, Plumas county.
 Denmore mine, Sierra county.
 54 Flat mine, Amador county.
 Red Hill mine, Shasta county.
 Walker mine, Shasta county.

Of these the Kelly Hill, Omega, Brandy City, Illinois and Spanish Ranch are mines of large capacity. Work is progressing on the dams of most of these, and on others construction awaits a more favorable season. So far as known, none have found that they cannot construct dams on the lines required by the Commission.

Foundry Notes.

THE Fulton Iron & Shipbuilding Works are about to issue a new catalogue. The first 32 pages will be printed this week.

THE Fulton Iron & Shipbuilding Works have just shipped a lot of mill supplies—shoes, dies, etc.—to four different mines in Mexico. "The Mexican trade is the liveliest branch in business just at present," said Mr. James Spiers. "Mining operations in Mexico are comparatively active, and we are getting our full share of the business."

THE Parke & Lacy Company have just made the following shipments: To the Utica mine, Angels, Calaveras county, one Ingersoll-Sergeant piston-inlet belt and geared duplex compressor, seven-drill capacity; to C. Staacke, Mexico, one Ingersoll-Sergeant piston-inlet single compressor, seven-drill capacity; to Pine Hill Milling & Mining Company, one single compressor, three-drill capacity; to Enreka Machine Works, San Francisco, one Lodge-Davis lathe and shaper; to Oakland, Alameda & Piedmont electric road, Fifield lathe; to White Star Laundry, Oakland, engine and boiler.

The Future of Gold and Silver.*

By S. F. Emmons, of the U. S. Geological Survey.

In reviewing the production of the whole country for the period under consideration (since 1880), it is to be remarked that the gold product has remained fairly steady while the silver product has nearly doubled. The average gold product of the country since 1873, as shown by available statistics, has been about \$33,000,000 per annum, except during the years when the Comstock mines were in bonanza, in the abnormal yield of which it is fair to assume the increased product during the years 1876-1880 was due. The falling off during the first half of the last decade was due to the restriction of hydraulic mining, which in the later years has been replaced by the normal increase from deep mines. It is probable that the increase for 1892 over former years is greater than present statistics show. On the whole, the gold industry may be said to be in a normal and healthy state, ready for a permanent though not necessarily rapid increase, as more capital is intelligently directed to its development.

The increase in the silver product has been phenomenal, especially when it is considered that the yield of the Comstock lode, which during the previous decade constituted about half the total product of the country, has become practically an insignificant factor, and that the average price of the metal itself has steadily fallen during the period, except for the few months immediately succeeding the passage of the Sherman Act; the average price for 1892 having been about 25 per cent less than that of 1880.

The prime factors in this increase have been the discovery and development of great ore bodies in limestone, such as those of Leadville and Aspen, the ores of which must be reduced by smelting. This has resulted in the building up of the great smelting industry in the West and, in consequence, of an immense increase of railroad facilities, which in turn have encouraged the investment of capital in other mining enterprises. The development of the great veins of Utah, Montana, and the San Juan region, although they produce ores not necessarily reduced by smelting, is nevertheless dependent upon railroad facilities which the smelting industry has been the most important factor in developing. In other words, the increase in the silver industry has been due mainly to favorable industrial conditions. If capital had not been invested in railroads and reduction plants, mining would have been confined to the richer ores near the surface, and would probably have been abandoned when these were exhausted; for it has been handicapped during the entire period by the abnormal figures at which the miners' unions have been able to keep the rate of wages, while they have been reduced in almost every other branch of industry.

That the industry as a whole has progressed in spite of a continuous fall in the value of the product has been mainly due to the fact that the larger reduction works, under the spur of the necessity of rendering the large capital invested in their plants productive, have displayed ingenuity and economy in improving their processes and in reducing the cost of fuel and other materials, so as to leave them still a margin of profit. The smaller profit is offset in the case of the larger smelters by the greater number of tons treated, and also by the utilization of other products besides the precious metals, such as lead and copper. As long, therefore, as these larger smelters can obtain even a very small profit, silver mining will be continued in the larger mines and in those whose ore is exceptionally high grade, while the smaller and less favorably situated mines will gradually be abandoned. It is to be assumed, moreover, that self-interest will induce the miners to consent to a reduction in wages when it becomes a question of that or nothing, and thus a still longer lease of life will be given to some established mines in the face of a continuous reduction in the price of silver; but when this price shall have fallen so far, without a counterbalancing rise in the price of lead and copper, that the larger smelting works are obliged to close, silver mining will be abandoned throughout the greater part of the Western region. This exigency is not, however, likely to occur while the price fluctuates, as it has done during the past year (1892) between 70 and 80 cents per ounce. †

Assuming that silver continues at about these prices, it is probable that the greater part of the silver product of the country will come from Colorado, Montana, Utah, Idaho, Nevada, New Mexico and Arizona, in the order named, and will gradually be reduced to between thirty and forty millions annually.

The annual gold product, on the other hand, is likely

to see a steady increase to \$40,000,000, and perhaps beyond, and its principal producers will be the following States and Territories, also in the order named: California, Colorado, Dakota, Montana, Idaho, Oregon, Alaska, Arizona, with a great deal of uncertainty as to the relative rank of the smaller producers.

An industry is of value to the country at large in proportion to its permanence and absence from violent fluctuations, and the silver-mining industry has been in this sense of great value. The large amount of capital invested in extensive plants and tributary railroads has given profitable employment to great numbers of people, and assured greater permanence than the many small gold mines and gold-reducing plants. Its destruction would therefore constitute a serious loss to the nation's industry. It may fairly be doubted, however, whether the course followed by the friends of this industry has been the wisest that could have been pursued, and it seems probable that if no attempt had been made to sustain the price of the metal by legislation, but it had been left to follow the natural course of trade, under the laws of supply and demand which govern the production of other commodities, it would to-day be in a more healthy condition. While its growth and increase of product would have been less rapid, those engaged in it would have been better able to forecast the future course of the price of silver, and would have regulated their investments accordingly.

The recent overproduction of silver, relatively to that of gold, which has led to an attempt to establish the world's coinage on a purely gold standard, is, however, the result of a normal, and, for the most part, healthy development of industrial conditions over a long series of years.

That these conditions are at present abnormally disturbed, and that those engaged in the silver industry find themselves in danger of great pecuniary loss, is apparently due in large measure to effects produced upon the price of the metal by legislative action. If the natural law of supply and demand be allowed to act freely, and if no attempt be made to control by legislative enactment the ratio between gold and silver, the variations will be less violent and less injurious to the industrial interests based upon silver mining.

The world's product of silver for the five years from 1880 to 1884 was on the average about equal in coinage value to that of gold. From 1885 to 1891 it has steadily increased, reaching \$185,000,000 in the latter year.

It still remains to consider what is likely to be the product of the precious metals throughout the world during the balance of the present decade from the point of view of the geologist and miner, as contrasted with that of the legislator and financier. From this point of view the most uncertain regions are Asia and Africa for gold, Australia and South America for silver.

The gold product of the United States is likely to show, as has already been stated, a moderate and steady increase. That of Australia is at any rate not likely to decline. In Asiatic Russia, which is said to have shown an increase of 9 to 16 per cent in late years, the product is likely to increase still more with the progress of the trans-Siberian railway now building. This region undoubtedly possesses great mineral wealth, and the gold deposits, whether placers or deep mines, are likely to be first developed. The most important increase in the gold production will, however, come from South Africa; and what is still more important, this increase will be of a more gradual and permanent character than that derived from California and Australia thirty years since, inasmuch as it will come from deep mines and not from placers. The greater part of the present production is obtained from a conglomerate belt, not unlike in its geological relations to the conglomerate belt from which the copper of the famous Calumet and Hecla mine is derived, and which is considered by some observers to be an old placer deposit like that of the Black Hills of Dakota. Recent borings have proved that this African conglomerate belt continues to be rich in gold at a depth of between 2000 and 3000 feet, thus assuring the permanence of its production for many years to come, and justifying the expenditure of capital in its development to an extent that may make its annual product very large. It is, therefore, quite fair to assume as a reasonable probability that the gold production of the world may increase to \$150,000,000 within a few years, and possibly to \$200,000,000 before the close of the decade.

Silver, which has the disadvantage in respect to gold of being too bulky for actual use as a medium of exchange in large sums, besides being in other respects naturally an inferior metal, is practically valued on a gold standard in all matters of international exchange, whatever value may be given to it within the borders of an individual nation by legislative agreement. The reduction of silver from its ores, as has already been stated, being so complicated a process, silver mining is far more dependent on favorable industrial conditions than gold, and its future development is hence dependent on its gold price. That there

still exist, if not in the United States which is probably the most thoroughly prospected country, at least in some part of the world, great bonanzas of silver, comparable in value to the famous Comstock lode, is not to be doubted; but with a low price of the metal they will be less diligently sought after, and even if discovered capital will be more reluctant to invest in them.

If no attempt be made to control by legislative action the commercial course of silver as a metal, its production will doubtless be governed by the same conditions that have applied to copper in the past twenty years, a metal with which it presents many analogies, both in geological relations and physical characteristics. When the production of copper became greater than the ordinary demands as commerce, its price decreased until only a few of the larger and more favorably situated mines could produce it at a profit. These mines were not necessarily the richest; on the contrary, the greatest producers have been mines possessing ores of very low grade, in large quantities, and so favorably situated that they could be worked very cheaply. When the production had fallen into the hands of a few companies, an agreement was entered into by a majority to keep the price up by restricting the production. In spite of its great power and strong financial backing this agreement could not be maintained, and the price has fallen from 20 to 50 per cent within the last twenty years. It might have fallen still lower had it not been for an increased demand for the metal consequent upon its extended use in electrical appliances. Although the consumption of this metal in the United States has increased fivefold since 1880, even some of the larger and more favorably situated mines find it advisable to close down from time to time and await a rise in the price; while many small mines, less favorably situated in regard to transportation facilities, have permanently given up the struggle for existence. In the long run, therefore, it is evident the supply of copper must be controlled by the demand, and no certain increase in the price can be looked for until the latter exceeds the former.

With silver there is less chance for the restriction of production, and the creation thereby of an artificial rise in the price of the metal, for the reason that the producing mines are much more numerous and their ownership less likely to fall into the hands of a few individuals or corporations. If, then, the production of this metal be not affected by legislative action or international agreement, it will be more subject to the law of supply and demand than copper. Among producers the law of the survival of the fittest will prevail, and the fitness will be determined by industrial conditions quite as far as by natural supply of ore. There will always be a certain proportion of silver-producing mines standing upon the border-land between working at a profit or at a loss. Such mines will close down with a fall in the price of silver below a certain limit, and start up again when its rise above this limit seems to have assumed a reasonable permanence, the limit being dependent on the industrial conditions that prevail in different localities.

Under existing conditions, as already shown, it is probable that the silver production of the United States will show a considerable decrease in the next few years. Probably that of Mexico and South America will be similarly affected, but possibly to a less degree, as their ores are relatively richer, and their mining industry is established on different industrial conditions and somewhat influenced by varying political complications. The product of Australia, as already shown, has already experienced a decrease likely to be permanent under present conditions.

It is therefore reasonable to look for a very decided decrease in the world's production of silver, probably to \$150,000,000, or even less if the expected increase in the gold product does not occur. In any event it is only a question of time, and probably not of very long time, when the relative production of the two metals will be about equal, as it was at the commencement of the decade. When in the downward course of the one metal and the upward course of the other the line has been crossed, and the relation between the production of the two metals shall be the reverse of that which now prevails, a decided rise in the price of silver may be looked for, which will render the mines upon the border-land again productive, and restore prosperity to the silver industry as a whole.

THE 46th anniversary of the discovery of gold in California was celebrated Wednesday, Jan. 24th, in San Francisco, Chicago, New York and other places, by various associations of California pioneers. It has not been so very long since the first nugget was picked up, but quite a good deal of history has been made since.

If new processes of working low grade ores, yielding \$5, \$8 and \$10 per ton can be applied, as the MINING AND SCIENTIFIC PRESS says, then there are hundreds of mines in Shasta county that can be made billion producers but which are now regarded with almost indifference.—Shasta Courier.

What has been done can be done.

*Abstract of a review of the Precious Metal Industry in the United States, contained in the "Mineral Resources of the United States," just published.

†It has not occurred during recent months with silver even at lower figures. It is true that a number of Colorado and Montana smelters were idle for awhile, but most have started up again.

Mines and Mining in Nevada County.

From Our Regular Correspondent.

The mining industry of this county is steadily progressing. New mines are being developed that bid fair to excel some of our famous gold producers when properly opened up. Since my last correspondence some rich rock has been extracted from the Electric and South Idaho mines, which has given renewed hope and energy to the stockholders. There are other facts which prompt us to believe that we are entering upon an era of unprecedented prosperity. The Omaha and Lone Jack consolidated mines last week paid a dividend of 15 cents a share, and Superintendent Mainhart informs your correspondent that the prospects of the mine were never brighter. At the Hudson Bay, one of our most promising prospects, the miners have passed through the hard rock, the present ground being more stratified and giving indications of a close approach to the rich ore shoot which is known to exist in this locality. At this mine they have only 20 feet to sink before they encounter the vein, which the owners hope will make them as rich and famous as their predecessors. Many hundreds of thousands of dollars have been extracted from the section in which this mine is located, and there is every reason to believe that the Hudson Bay is destined to become one of the future gold producers.

A new quartz mill has been erected on the Spanish mine at Nevada City. It is equipped with all the appurtenances of a first-class mill. It is stated that the mill will be kept busy night and day, crushing the ore extracted from the mine. The prospects of this mine are exceedingly favorable, the ledge producing ore in large quantity and of good quality.

Preparations are being made at the Granite Hill mine for a Midwinter Fair exhibit. We owners are highly elated over the possibility of their making such an exhibit. They realize the importance of such an undertaking and the great good that will accrue therefrom, hence their prompt and praiseworthy action. Considerable development work is being done at the mine, and the ledge promises to be a large and valuable one.

A few days ago some splendid looking quartz was brought to town from the South Idaho mine. The quartz contained gold all through and was extracted from the 140-foot level east. This mine is owned chiefly by residents of this city, who are working it with commendable energy. The shaft is 155 feet deep, and is being sunk on the vein; and we hope the efforts of the company, which is composed of business men and miners, will be crowned with success.

Last week I referred to the purchase of a new mill by the Electric Mining Company. This week it is my pleasing duty to state that a rich ledge has been discovered in the shaft at a depth of 350 feet. The ore is pronounced as being equal to any ever discovered on Osborne Hill, and promises surprising developments in the future. The ledge is from 16 inches to 2 feet in width. This is good news for the Electric Company, and I heartily congratulate them on their newly-found wealth.

At 8 o'clock on Wednesday night of last week the pump at the Idaho-Maryland mine made its first stroke since the fire. The pump was idle just eight days, and the management of the company are to be commended for the energy and enterprise displayed in bringing about this satisfactory result. The pump is working regularly day and night, and in a very short time the mine will be relieved of its water. A large number of men are employed repairing the shaft and constructing new buildings, and when this is accomplished operations will be resumed on an extensive scale.

Yesterday your correspondent, in company with Altonso Tregidgo, M. E., paid a visit to the Omaha and Lone Jack Consolidated mines. We were met at the mine by the affable and courteous superintendent, Geo. Mainhart, Esq., M. E., who personally conducted us through the works, both on the surface and underground. Every point of interest was explained by Mr. Mainhart with a precision that indicated a mind well stored with information concerning the property of which he is the efficient manager. The present standing and prosperity of the mine is due to the energetic and enterprising efforts of Mr. Mainhart, who has superintended the mine since its rehabilitation some years ago. Although it has been an uphill fight, and numerous obstacles were encountered that would dishearten a less courageous character, this gentleman has persevered, and is to-day enjoying the reward of services faithfully performed.

The Omaha & Lone Jack Consolidated is one of our

most famous mines and possesses an enviable reputation. The mine is great in extent and wealth and increases in richness as depth is attained. The property is a consolidation of the Omaha and Lone Jack mines and has an extent on the vein of 2600 feet. The mine has two incline shafts, each having attained a depth of over 1500 feet. At the present time, development work is being done entirely in the Lone Jack property. These two mines were connected at the 1400 level. The Lone Jack shaft is being sunk below the 1500 level and contains a large vein of ore which is very productive. The ore is hoisted through the Lone Jack shaft to the 1400 level, from whence it is conveyed in cars to the Omaha shaft, where it is hoisted to the surface. This system is necessary because of the lack of motor power at the Lone Jack shaft; but this is very expensive, necessitating the employment of several sets of carmen, and Mr. Mainhart informed me that during the summer a new hoisting engine will be placed at the Lone Jack shaft and will be propelled by electricity. This will cut down the expenses of hoisting and greatly facilitate the development of the mine. As already stated, the prospects of the Omaha Con. were never brighter. Last week a dividend of 15 cents was declared and another one is almost ready for declaration. The ledge in the mine is large and full of gold-bearing ore. It seems that the ground in the Lone Jack shaft is undergoing a process of evolution, passing from granite into a diabase formation, such as the North Star, New York Hill, Hudson Bay and the Peabody mines contain. The management and all mining experts consider this as a favorable omen for the future prosperity of the mine. A large number of men are employed at \$3 per diem. The mill, which consists of 28 stamps, is kept busy day and night crushing ore from the mine.

Grass Valley, Jan. 23, 1894 SAMUEL BUTLER, JR.

Mining in Siam.

Following is an outline of the conditions under which prospecting licenses and mining leases are now granted in Siam:

1. Prospecting licenses are granted for a period of 12 months from the date of issue, and extend over the whole of the province for which they are taken out; the fee is 40 ticals (\$24), and the necessary passports accompany them.
2. Exclusive prospecting licenses may be taken out for a specific area (of which a sketch plan should be supplied) and the area is secured for prospecting purposes to the holder of the license.
- The other conditions are the same as for prospecting licenses, except that the fee is 80 ticals (\$48); the license gives ordinary rights over all the remainder of the province. Both the above are renewable.
3. Leases of mining areas are given to holders of prospecting licenses. The application should be accompanied by a sketch plan of the area required, and fairly representative samples.
4. The term is 25 years, renewable if desired.
5. The size of the areas are as follows:
 - (i) Thirty acres on a well-known lode within five miles of an existing mining area.
 - (ii) Eighty acres on a new lode within five miles of an existing mining area.
 - (iii) One hundred and fifty acres on a new lode in a new mining district.
 - (iv) One hundred and fifty acres, 240 acres and 450 acres respectively in the case of quarries, placer, iron and coal mines.
 - (v) Five acres for mill sites outside mining areas when necessary.
6. The number of areas taken up need only be limited by the pecuniary position of the grantee.
7. The stamp fee on the signing of the indenture of lease of each area is 50 ticals (\$30).
8. The royalties payable are:

Three per cent on the gross product on gold and precious stones.

Two and one-half per cent on the gross product on coal, lignite and iron.

Four per cent on the gross product on all other metals and minerals.

9. The yearly rent is at the rate of two ticals (\$1.20) per acre; royalties and rent are payable half-yearly.

10. Necessary passports accompany the indenture of lease.

11. The lessee's covenants include supplying the department with an accurate map of the area and work, and samples of geological and mineralogical specimens met with, erecting boundary marks, continuing active work, etc. In case any area does not pay, it may be, under certain conditions, surrendered at any time during the 25 years.

12. The lessee of a mining area is required to have an agent in Bangkok registered at the office of the department.

Proceeds of Nevada Mines.

The annual report of State Controller R. L. Horton shows that the total bullion product of the mines in Nevada for the twelve months beginning October 1, 1892, and ending September 30, 1893, was \$2,501,169. Storey county is credited with \$1,270,008; Elko, \$188,729; Esmeralda, \$19,320; Eureka, \$371,562; Humboldt, \$9334; Lander, \$206,345; Lincoln, \$162,950; Lyon, \$35,134; White Pine, \$7865. This statement represents the bullion yield of ores. Following is the product from tailings: Lincoln, \$5000; Lyon, \$66,691; Ormsby, \$133,713.

The product credited to Ormsby and Lyon should be added to that of Storey county, as the bulk of the tailings worked in Ormsby and Lyon county mills represent the residue from the reduction of Comstock ore, and this swells the total bullion yield of Storey county to \$1,470,000.

The *Enterprise* estimate of the total bullion product of Comstock for the year 1893, published in the issue of December 31st, included the twelve months from January 1st to December 31st. The statistics of the last quarter of 1893 not being obtainable until next month, the product of that quarter was estimated and the total yield for the year placed at \$800,000. The total product for the State for 1893 was estimated at \$3,000,000 in the same statistical article.

Sliokens.

JOHN F. REED has charge of the San Bernardino county mining exhibit at the Midwinter Fair.

THE January rains have started up mining in the placer and shallow diggings in Shasta county.

THE Omaha Mining Company has declared a dividend of 15 cents per share which is now payable.

THE Grass Valley Union is getting out a Midwinter Fair edition of 10,000 copies. It is expected to excel any similar edition ever issued in that part of the State.

THE "180" mine, in Bendigo, Victoria (Australia), recently referred to in this paper by Mr. T. A. Rickard as being the deepest mine in the world, being 2900 feet deep, has reached the 3000 level.

THE Copper King mines, above Clifton, N. M., were "jumped" by a party of prospectors when the new year began. They learned later that the owners of the property had filed papers to hold the mines without doing work, hence the energy of the jumpers was wasted.

THE Alta Sierra Gold Mining Company has filed articles of incorporation. Principal place of business, San Francisco. Capital stock, \$1,500,000, with Frank P. Paterson and W. W. Watson of San Francisco, T. H. Henderson of Oakland, Thos. C. Pedler of Golden Gate, and J. M. Whitworth of Berkeley as directors.

THE Dutch Mining and Milling Company has filed articles of incorporation. Principal place of business, San Francisco. Capital stock, \$1,500,000, with Albert Trittenbach of Sonora and Thomas M. Carroll, Emil Trittenbach, T. J. Sullivan, G. Trittenbach, John H. Sievers and W. H. Metson of San Francisco as directors.

THE Allison Ranch Ford Gold Mining Company has elected as a board of directors, Edward Commins, D. S. Collins, Henry Silvester, Martin Ford and Daniel Brown. The board has organized by electing Edward Commins, president; D. S. Collins, vice-president, and Edward Fitzsimmons, secretary. In all probability active operations will commence on the property before very long.

THE search for the lost Pegleg mine has not been abandoned, notwithstanding the lives that have been lost and the suffering endured in search for the location of this mysterious property. Another expedition is said to be quietly fitting out in Los Angeles, which, it is claimed, is in possession of newly discovered evidence as to the mine's whereabouts. Men of means are reportedly backing the venture, and the expedition is to have a very auxiliary to a successful search that money can command.

COMMENTING on a reference to the Utica mine, in a recent issue of this paper, the *Amador Ledger* says: "The Kennedy is also an example of what has been accomplished by development upon a property which was lying idle and thought to be worked out. When F. F. Thomas secured a bond on the property and began its development by sinking, it had been idle for many months, but for several years past and at present it has been making handsome returns to its owners." "Handsome" is a very moderate adjective to use for a property that paid \$480,000 clear profit in 1893.

THE Sierra Nevada Mining Company has elected the following officers: President, C. H. Fish; vice-president, C. Hirschfeld; Secretary, E. L. Parker; superintendent, Roger Prendergast; vice, A. J. McDonell; directors—Charles H. Fish, Charles Hirschfeld, A. K. P. Harmon, Thomas Cole and H. Zadig. Out of a total of 100,000 shares 88,774 were represented at the meeting. The new superintendent has charge of the work in the Union Consolidated mine from the 900 level, of which the joint Sierra Nevada drift is being advanced into the latter ground. It is rumored that there will be an increase in the number of miners employed in the Sierra Nevada next month.

A MINER and prospector, lately from Colorado, warmly criticises the system in vogue in Arizona of working mining locations. He says the prospector finds a fair showing of ore, but all around he finds monuments, without the slightest indication of work done on the property other than the piling up of the stone corners. It may be that the property has been abandoned for years, owner may be dead, but in order to find it out the prospector has to take a trip to the county seat and hire some one to look over the books for him. Some of the Arizona prospectors are holding on to 30 or 40 "mines," upon each of which they, unaided, pretend to do \$100 worth of work per year.

Hydraulic Mining.*

A REVIEW OF THE INDUSTRY BY DR. HENRY DEGROOT.

In Eight Parts—Part V.

Water-Distributing and Gravel-Washing Apparatus.

While the dam and the ditch with its appurtenances are being constructed the gravel-washing and the gold-saving implements and apparatus should be gotten on the ground and put in place, the point where they are to be located being immediately under and in close proximity to the lower end of the ditch. At its lower extremity the ditch empties itself into a section of flume, at the end of which is situated the bulkhead or pressure box, a large oblong receptacle, built of strong planks and so called because the head or pressure of the water is here measured.

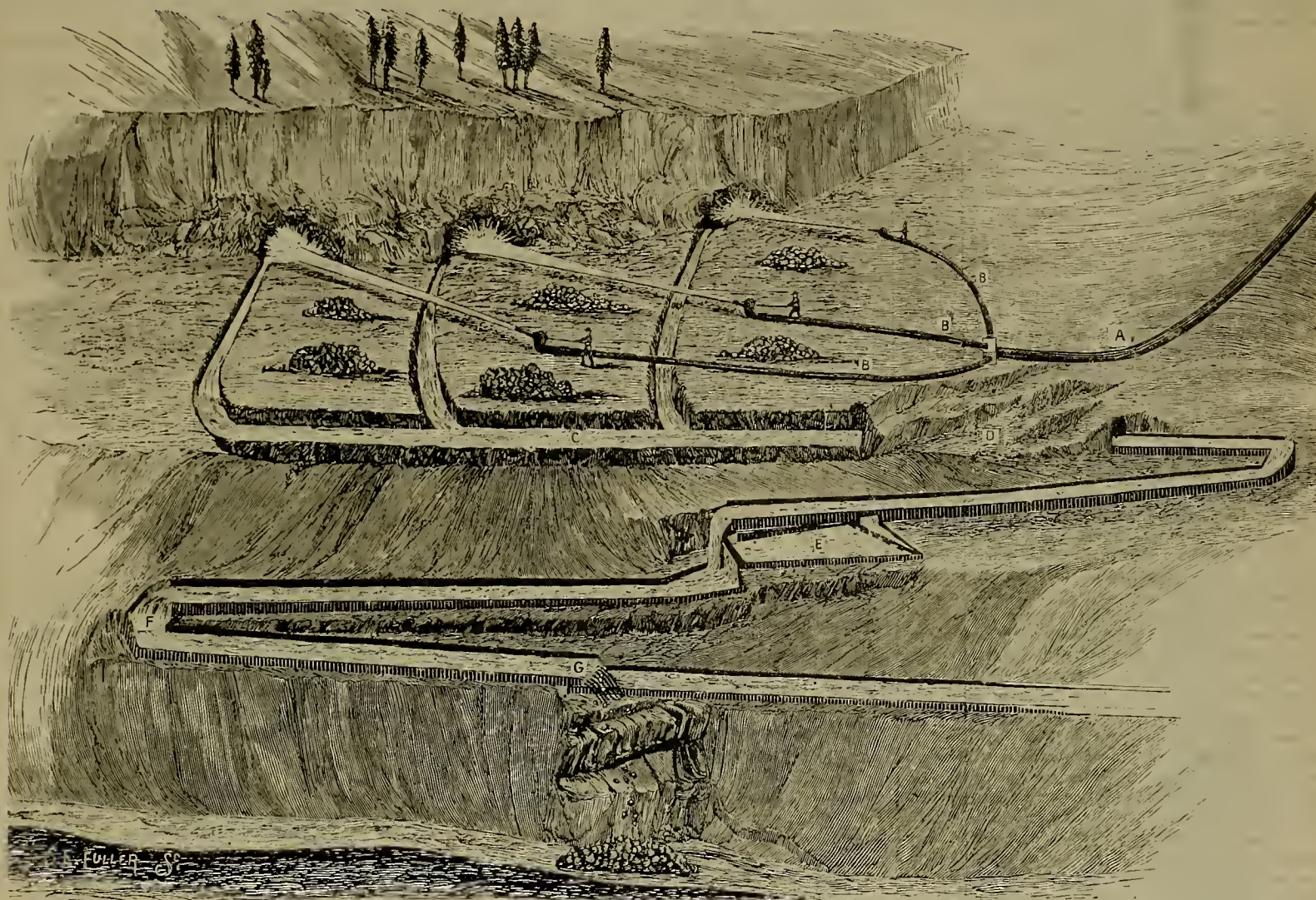
Connected with or located immediately above this structure is the sand box, a square compartment sunk several feet below the floor of the flume, the design of this box being to catch any sand or fine gravel coming down the

being brought into a placid state in the upper before it enters the lower one. That the water supply and exhaust be kept in equilibrium as near as may be, a waste gate should be placed in the flume above.

The main supply pipe starting from the bulkhead should descend to the washing pit with as few deflections, rises or depressions as possible, as these not only tend to retard the passage of the water through the pipe but also promote the collection of air within it, rendering an explosion imminent. To obviate this at all times and to guard against it when filling the pipe, at which time it is much increased, air valves are to be placed at suitable intervals along it. All large water pipes should be equipped with a sufficient number of air valves, these escapes being provided with brass floats, as the wooden ones are apt to swell, and becoming wedged in the valves, the pressure of the air without is insufficient to press them down. When the bank down which the pipe has to be carried has much inclination it should be placed on a stout frame work, and, besides

ter to be transmitted through it, a pipe 22 inches in diameter being sufficient to pass anywhere from 1500 to 2000 miner's inches. When the quantity of water ranges from 3000 to 4000 inches a 30-inch pipe should be chosen, the friction caused by the passage of the water being less, comparatively, in large than in small pipes. The iron used in the construction of these pipes varies from No. 16 to No. 11 and lower, according to the pressure to which they are to be subjected. For a 22-inch pipe No. 16 iron is usually employed for pressure up to 150 feet; No. 14 from 150 to 200 feet, and No. 12 from 200 to 300 feet, the latter being about as great a head as the water is apt to be used under in hydraulic washing. For a 30-inch pipe No. 14 iron has been found to answer for pressure up to 150 feet, and No. 12 from 150 to 275 feet.

Before being placed in position these and all other iron pipes to be used in connection with hydraulic mining should be immersed in liquid asphalt, such as is now being manufactured for this and similar purposes. Coal tar



General View Showing Plant in and Below the Washing Pit.

A—Main Pipe conducting water from Bulkhead to Distributor. BBB—Distributors. C—Sluice. D—Rim-rock Tunnel E—Undercurrent F—Drop. G—Grizzly

ditch, such material, when it reaches this point, falling into the sink, being the depressed portion of the box, and is there retained. Through a gate at the side of the box this stuff is discharged as often as its accumulation makes it necessary. If much sand is allowed to enter the sand pipe it tends to impair the efficiency of its action.

The pressure box, with a width of about six feet, varies in length from ten to thirty feet, a greater length being required when it has two feed pipes to supply, also where the sand box forms a part of it. For the sand box a wooden apron is placed in the bulkhead and so arranged that it catches the sand and drops it into a chamber below, which is supplied with a discharge gate. A gate is set at the upper end of the pressure box to prevent any floating stuff entering it. There should be water enough in this box to cover the supply pipe to a depth of several feet, that no air, or as little as possible, be carried into it, to which end this box is usually divided into two compartments, the water

being braced on both sides, should be heavily weighted with boulders as a security against any movement which, should it occur, might cause much inconvenience and possibly serious damage. This pipe for several joints at its upper end is much enlarged to ensure a more free admission of water. Below that point it is all the way of uniform size, or as far down as the junction of the branch pipes, if any there are. In early times the letting on and shutting off of water was effected with a wooden gate, raised and lowered by means of a lever. For this crude and clumsy contrivance there has now been substituted in all large works the heavy cast-iron gate operated by a screw, powerful and easily manipulated. Everywhere now, on the dams, ditches and reservoirs and in the washing pits, these improved structures are in use, differing but little, except in size, and in this according to the service required of them.

A powerful machine of this kind is employed for admitting and shutting off water at the entrance of the main feed pipe. In the performance of this task care should be taken to let on the water gradually, as too great a rush might carry in so much air as to cause a disaster, this being a precaution to be always observed under similar circumstances.

The size of the feed pipe depends on the quantity of wa-

ter which these pipes were formerly coated, is now giving place to the asphalt preparation, it having been found equally cheap and more efficacious.

Formerly the lower end of the feed pipe was connected with what was known as the distributor, a short cast-iron box firmly anchored in the washing pit, the duty of which was to receive the water brought in by the feed pipe and distribute it to the several smaller pipes that lead to the giants or monitors, the number of these pipes corresponding with that of the machines to be supplied with water. Being ponderous, costly and liable to burst, the distributor has come to be pretty generally discarded, the plan of connecting all distributing pipes directly with the main feeder, as now practiced, having superseded it.

The accompanying plate presents a general view of a portion of the gravel-washing and the gold-saving appliances located in and below the washing pit.

A Rare Gold Story by Pliny.

Pliny, that rare old gossip, tells among his other extraordinary stories, that of the Bactrian method of obtaining gold, says an unidentified exchange. The sandy desert of Bactria in the days of that historian was, so the old man says, literally swarming with ants "slightly bigger than

*This article was prepared by the late Dr. De Groot for the Eleventh Report of the State Mineralogist, just issued; but its publication with that of much other valuable matter was prevented by the necessity of revision and omission, so that the volume might be reduced to reasonable limits. It covers familiar ground, but is, on the whole, a complete and careful review of the industry and hydraulic-mining methods. The article has been furnished this paper by State Mineralogist J. J. Crawford.

foxes." These gigantic representatives of the genus homonoptera burrowed deeply into the sandy wastes, their tunnels and galleries often being hundreds of feet in extent. The earth removed from these burrows was always carried to the outside and thrown up in hills (remember Pliny says this) "of a bigness exceeding a palace." This debris—sand, earth, etc.—was soon found to be wonderfully rich in small nuggets of gold. The danger from the ants was greater, however, than that from the Indians in the early days of gold digging on the coast, and many stories are told of men who were literally devoured in a few moments by the fierce owners of some disturbed burrow. Some observing old hunter at last discovered that the giant ants slept during the hottest hours of the day. After that the seekers after the yellow metal only made their incursions at the proper time, and even then they only stayed long enough in the desert to fill their sacks with the golden sand, which they took home to sift at leisure. With all this precaution the ants often "swiftly pursued the fleetest horses, and it was only by using various stratagems that the invaders managed to escape alive."

On the Colorado Desert.

Abstract of article by John R. Weeks in Santa Maria Times.

All that this country needs to make it a great wealth producer is plenty of giant powder and beans properly applied and mixed with a little brains. Last winter when we came out here a one-half interest in a claim was offered us for sinking 50 feet on it. The owner begged us to take it. It did not prospect over \$20 a ton on the surface, and my partner refused to touch it. I offered the opportunity to several parties, among others to a couple of enterprising citizens of Santa Maria, who declined. Finally a Frenchman took it, and sunk 75 feet. At 50 feet he had a six-foot vein of ore milling \$30 a ton and some of it away up in the hundreds. At the present depth the ore has turned loose, but richer still. A one-half interest in the claim is worth over \$25,000 to-day, and there is double that amount in sight.

There are more such opportunities for men of small means and backbone enough to undertake them. Still, you don't get such a chance every day. Another claim—the Carlisle—was purchased undeveloped for \$1100. An expenditure of \$3500 more has put about \$8000 worth of ore on the dump and about \$30,000 within sight below.

I have never been in a camp where you could go out and bring in so many samples of rich ore from different ledges as in this old Rattler district. In most camps there are only one or two or at most three good claims. Here are a dozen within five miles that will all make properties worth six and seven figures with proper development, and plenty more to be found. One claim in which I was interested 16 years ago, and abandoned, was recently sold, and a one-half interest brought \$12,500. I met the lucky seller, and we had a laugh over it.

I have in my pocket specimens of float, stephanite (75 per cent silver) that a year ago was worth over \$20,000 a ton, but thanks to Grover it is not worth looking for now. There is plenty here for all who have the necessary capital and sand enough to tackle the desert.

In my last letter I told you of being caught in a heavy thunder-storm in the middle of July and camping all night in the mud in the middle of a dry lake. The climate is rapidly changing for a wetter one, for a month ago I was caught in the same locality in a snowstorm of two days' duration. Most people have altogether mistaken ideas of the desert, and it is a bugaboo to the majority of people. The few drawbacks can be easily overcome after you get used to the change of conditions. Water is scarce and poor, but, by boiling thoroughly and using citric acid freely, it overcomes that difficulty. Experiment has proved that water can be had in wells in many places. Fuel is scarce, but gasoline is cheap and not as expensive as coal and wood on the inside.

Timber is scarce too, but little is needed in ordinary mining operations, as no water is met with in any of the mines so far explored. There is no expense for pumping machinery. To sum it all up, our ores can be mined and milled at the same or less expense than those closer to the coast and "inside," which run from \$15 to \$25 per ton, while our ores run from \$25 a ton up into the hundreds, and the sulphuret concentrates away up into the thousands.

There is very little danger in getting lost and dying on the desert if one uses ordinary precautions and has a little horse sense. Most of the cases have either been intemperate men or those who were too bull-headed to take advice. More than 90 per cent of them are whisky or beer drinkers. There are many more, however, than are ever reported in the newspapers.

The notorious Breedlove case two years ago was evidently not from want of water, but poison from something they had all eaten. Men dying from thirst do not die as they did, nor should men in ordinary health perish in so

short a time after water is exhausted. It is the healthiest country on earth. No one has been known to die a natural death out here. Whatever disease a man may have—rheumatism, catarrh, throat or lung complaint especially—the climate is a specific, and for eight months in the year is as delightful as can be asked for, never any fog, and so warm that I never put on a coat for seven months this season.

Va. Dale Mill, Colorado Desert, Jan. 10, 1894.

The Idaho Placers.

A correspondent at Caldwell, Idaho, thus writes to the Butte *Inter-Mountain*: The Snake, Boise and Payette have each given homage to thousands the past season who would have otherwise gone in actual want. The former's banks were lined from early spring until late this fall with both old-timer and pilgrim—the former with his oft-repeated tales of oyster-can "cleanups" in Alder, Confederate, Boise Basin and Jordan creek, the latter with his many inquiries and eagerness to learn the real causes of Snake's "golden-floored" waters. As of old, a repetition of one condemning and others settling on a bar has been the result all season.

The number of colors in a pan of Snake pay dirt excites the best of 'em, but, contrary to the reports sent broadcast all summer concerning the rude methods and big cleanups, readers of your valuable paper, especially those contemplating casting their lot with old Snake, should be warned in time that \$1.50 per man with rocker would be a conservative average of the output all summer. With the possible exception of a half-dozen bars from Shoshone Falls to Huntington, Or., which have run as high as \$4 per day with rocker, nothing has been demonstrated in flour-gold mining this year to encourage any one to leave a situation, no matter how small his remuneration. The great excitement caused by the trial of a new machine, said to catch invisible gold, has subsided.

These machines all have some merit, but, strange as it may seem, the inventive mind runs in gold-saving machines, while with them all no thought is given to a mode of raising water on to high river bars cheaply. All these machines require water, and trials in places with an irrigating ditch for supply look well; but place the same apparatus on a high river bar, with no water except the millions of gallons flowing hourly by, and it is not so encouraging.

New-fangled gold savers are of secondary consideration, for there are dozens of home-made machines that will save 90 per cent of the gold, and the cost to build is a little lumber, nails and labor.

Let those who spend their spare moments racking their brains on flour gold turn their attention to contriving means of getting water on our bars, and we'll do the rest. Then watch Idaho make strides for first place as a gold-producer.

Road Legislation in the United States.

The investigation into road construction and management in the United States by the U. S. Agricultural Department, and under Gen. Roy Stone as special agent, is said to be making good progress. State geologists are beginning to supply information as to materials available for road construction, and 50 engineers of railway companies have sent in reports. This material is now being tabulated and a map is in preparation which is to show the location and cost of the best available road-making material throughout the country. A bulletin is soon to be issued outlining the new road laws of 14 States.

General Stone will say that road legislation is proceeding on ten distinct lines, ranging from more rigid operation of the old system to the direct building of State roads. Tennessee gives the county courts full power and direct control over roads and eliminates local politics and prevailing easy-going methods. The courts classify the roads, establish districts, appoint commissioners and assess road taxes. Vermont, New Hampshire, North Dakota and Oregon increase tax levies for roads. The latter State allows county courts to levy a special tax of 50 cents on the \$100 and \$2 per head for a county road fund. New Jersey absolutely abolishes the payment of road taxes in labor and the abolition is almost absolute in Wisconsin. In Oregon, Indiana and by special acts in Ohio, local assessment applies to construction for a three-mile limit on each side of the road. In Oregon the county may assume half the cost, and in Ohio a large share is assessed upon the county. In Pennsylvania and New Jersey much work has been done by townships and by township bonds. The issue of county bonds is provided for in New York, New Jersey, Indiana, Michigan and Washington; but in the two latter States a popular vote is required to authorize the issue.

State highway commissions have been created in Massachusetts, Vermont, Pennsylvania, Ohio, Michigan and sev-

eral other States. Massachusetts has the only permanent body of this character charged with important duties connected with actual road construction; the other commissions can only inquire into existing conditions and recommend methods for improvement. New York is experimenting with convict labor on roads near the Clinton prison, and Tennessee law makes available for this purpose all prisoners confined in county jails or workhouses.

New Jersey is probably the only State giving direct aid to road-building. The report says: "This aid is limited to one-third of the roads built by the counties and to the sum of \$75,000 per annum. The highway commission of Pennsylvania has reported a bill for State aid to the amount of \$1,000,000 per annum to be distributed among townships in proportion to the road tax paid by them. The townships, according to this bill, must set aside 25 per cent of their tax for making permanent highways. Co-operative road-building, as provided for in New Jersey, has been very successful. Abutting land-owners pay one-tenth of the cost, the State one-third, the county the remainder, by sale of bonds. Under this law, ten miles of road were built in 1892, 25 in 1893, and 64 are applied for by land-owners for 1894.

The data already gathered shows that new roads are constructing in many parts of the country and that increased knowledge and skill, improved machinery and methods and extended practical experience are rapidly lessening the cost of good roads. Civil Engineer Harrison of Asbury Park, N. J., is authority for the statement that, while three or four years ago the cost of road-building was \$10,000 per mile, it was last year \$3500 a mile. Prof. J. B. Hunnicutt, of the University of Georgia, in response to an inquiry from the bureau, states that the cost of good, hard roads recently built in Georgia, providing for a track of stone and one of earth, was \$1200 a mile. Supervisor Chapin of Canandaigua, N. Y., in a letter to General Stone, reports that ten miles of a single-track stone road, with an earth track each side, was built in that town for \$700 a mile. Active interest in the movement for better roads is shown by the railroads generally. Special or reduced rates are offered by many railroads, and a tabulated statement of the various concessions in shipment rates by a large number of companies has been prepared.

What Silver Demonetization Has Done.

Extract from Review of Eureka District and County, Nevada, in *Weekly Sentinel*.

The review of the mining operations of Eureka county in 1893, which we herewith publish, will serve to illustrate to the world the effect of the demonetization and low price of silver on Eureka district, which, since its discovery in 1864 and the commencement of its active development in 1870, has yielded in gold, silver and lead in the neighborhood of \$125,000,000, and in 1878 produced in gold and silver alone \$5,500,000 from 238 mines, big and little, then under active development. The average value per ton in gold and silver of all the ore that was mined in Eureka county during that year was \$45.40%. During the last year, 1893, there were only 30 producing mines and three prospects under development in the entire county. Among them the Diamond mine was the only one that cut any figure in active development or the employment of miners on days' pay.

During 1892 the average number of miners engaged in the county was 140 on days' pay and 200 leasing, tributizing and working on own account. Last year the average number was 83 on days' pay and 127 leasing, tributizing and working on own account. Out of a total average of 210 miners in the county Eureka district gave employment to 172 men, 68 of whom worked on days' pay and 104 on lease, tribute and own account. The figures show a decrease last year of 57 days' pay miners and of 73 men under lease, tribute and on own account, and a total falling off of 130 men, or 38½ per cent., of the previous year.

The yield of ore from all of the producing mines of the county during the year 1893 aggregated 14,606½ tons, with an approximate gross value of \$26 per ton, and 14,515 tons out of the entire yield of the county came from the mines of Eureka district. Following are the names of the producing mines and the number of tons yielded by each for the year 1893:

From the Bullwhacker, 297; Dead Broke, 11; Delaware, 117½; Diamond, 6,639½; Dunderberg, 401½; Ethel, 23; Eureka Consolidated, 3,171½; Hamburg, 942½; Idaho, 30; Jackson, 1,084½; Lord Byron, 28; Maria, 12; Needle, 3; Phenix, 163; Pioneer, 83; Richmond, 1,135; Silver Connor, 59; Silver Lick, 7; Silver West, 18½; Williamsburgh, 84; small lots by consignees, 205½; Cortez mines (limited), 36; Comet and Good Luck (Safford district), 5; Island Queen (Cortez district), 11; Lincoln (Diamond district), 11; Sada Lindsay (Union district), 28.

The 36 tons from the Cortez mines (limited) were valued at \$7,600, or \$211.11 per ton. This is the greatest mine in

Eureka county to-day, both in the extent of the mineral lands and richness of the ore. No active work has been done in it for over a year, because of the low price of silver. The Comet and Good Luck mine at Safford district is said to be a good property. The 5 tons of ore shipped from there were taken out by one man, who is in charge of the mine, and netted over \$1,000.

What the low price of silver is doing for Eureka county may be estimated from the following statistics for the years ending September 30, 1891, 1892 and 1893. For 1891 the yield of ore from Eureka county was given as 27,664 tons, with a total gross value of \$904,523.27, or \$32.70 per ton. The cost of extraction, transportation and reduction

The Diamond mine has come to the front and is steadily increasing its output and value. For the year ending Sept. 30, 1892, it yielded 8,996 $\frac{3}{4}$ tons, with a total value of \$188,100.33, or \$20.90 per ton. For the year ending Sept. 30, 1893, notwithstanding that the mine was idle during the half of July and all of August and September, and under active development only 9 $\frac{1}{2}$ months, the yield was 8,008 $\frac{1}{2}$ tons, with a total value of \$230,802.10, or an average of \$28.81.

The Eureka Con. mine, for the year ending Sept. 30, 1892, produced 6,226 $\frac{3}{4}$ tons, with a total value of \$119,288.63, or an average of \$19.16 per ton. For the year ending Sept. 30, 1893, the entire yield reached only 3,011 tons,

The Greatest Building at the Midwinter Fair.

The Midwinter Fair is progressing toward completion rapidly. The management has declared that the great opening shall take place on Saturday, January 27th (to day), and the Governor has declared a public holiday on that date.

We introduce on this page a view of the main entrance to the largest building on the grounds—that devoted to manufactures and liberal arts. It is of Moorish design, 450 feet long and 250 feet wide, its height being 55 feet, and it has an annex 75 feet in width, nearly the whole length of the structure. It has all the picturesque



MIDWINTER FAIR—THE GRAND ENTRANCE OF THE MANUFACTURES AND LIBERAL ARTS BUILDING.

amounted to \$781,807.39. The yield of 1892 was 24,533 tons, with a gross value of \$790,714.22, or \$32.23 per ton, and the costs \$550,471.36.

The yield of 1893, with the big drop in the silver and lead markets, was only 14,755 tons, with a gross value of \$390,044.20 and costs of \$372,893.88. The average value per ton of all of the ore mined in the county during the year ending Sept. 30, 1893, was only \$26.43, and if the yield at the Diamond mine with 8,008 $\frac{1}{2}$ tons at \$28.81 is excepted, the average value per ton of the balance of the ore mined in the county during the given years was only \$23.59. The reasons for the reduced average value may be found in the low prices of silver and lead, the comparatively small amount of new ground broken and the fact that the lessees and trippers confined their work to prospecting the old mines and scratching around old ore chambers in place of mining for new ore bodies in virgin ground,

with a total value of \$65,061.48, or \$21.61 per ton, being a decrease for the year of more than 50 per cent in the tonnage, but an improvement in the grade of the ore.

The Richmond mine, for the year ending Sept. 30, 1892, produced only 1,153 $\frac{1}{2}$ tons, with a total value of \$40,074.35, or \$26.48 per ton. The yield for the last year, ending Sept. 30, 1893, recorded a very serious falling off, inasmuch that it reached only 913 tons, with a total value of \$19,176.88, or \$21 per ton.

THE Austin *Reveille* says that the Pradier Bros. of Austin, Nev., have handed to Salt Lake City capitalists one-half of their antimony property located on Big creek, Lander county, for the sum of \$35,000. The finest antimony yet found has been taken from this property. Expert testimony proves this to be a true fissure ledge from 50 to 60 feet in width,

ness that is so readily obtainable in this style of architecture, and with the colonnade which surrounds it, and its towers, will introduce the various forms so popular in the mission buildings. Roof gardens will be found in the loggias of the towers. The roof will be covered with encaustic metal tiles, and a skylight, and the building will be lighted from the top as well as from the sides.

THE Watsonville beet-sugar factory finished the season's run last Friday afternoon with gratifying results to the company and all concerned. Seven thousand seven hundred and sixty-nine tons of sugar were manufactured.

THERE is every indication that the settlers on railroad grant lands in southern California will be defended in the contest for their property by the United States Government,

The Alkali Metal Sodium.

From Article in *Scientific American*.

At its melting point sodium is as liquid, mobile and lustrous as mercury. It instantly tarnishes in damp, but not in dry air. It becomes pasty at about 122° F. At the ice temperature it is still ductile, but below zero Fahrenheit becomes brittle and crystalline. Sodium stands high as a conductor of heat and electricity, being in these respects surpassed only by gold, silver and copper. Hence, in cases where mercury is applied as a mobile liquid conductor, the liquid alloy might be preferable—protected, of course, from damp air, say by inclosure in a space communicating with the air only through a tube containing calcium chloride.

An American chemist, Charles A. Seeley, now deceased, discovered a surprising property of these alkali metals. They dissolve, as metals apparently, in liquefied ammonia gas, and on evaporation are left in their original metallic forms. The solutions are transparent and of deep blue color.

As aforesaid, the discoverer of the alkali metals found that mercury containing a little of them would enfilm or wet (so to speak), iron, steel and platinum. About 1840 an English chemist, Robert Mallet, discovered also that melted metals having no natural affinity for iron dissolve it rapidly when containing a little sodium or potassium. An American chemist, Henry Wurtz, took up these subjects in 1857, and carried them much further. He made very numerous experiments and inventions in this field, and patented some of them. The cost of sodium then ranged in this country from \$8 to \$10 per pound, and his inventions, patented prematurely, about 1865 or 1867, were, therefore, of no economical value and have long been public property. Now that it is proved, however, by Castner's work, that if a market exists for sodium it can be produced at a cost of 18 cents per pound, and the liquid alloy doubtless for little more, these forgotten devices should be revived and improved upon by supplementary inventions. Some of these methods of H. Wurtz were as follows:

First—A method of rapidly making these metals into solid amalgams, in which forms they can be handled, and their great energies and affinities utilized, without danger or difficulty. Combination with mercury involves great and usually highly explosive evolution of heat, which Wurtz obviated by a very simple device. Instead of starting with pure mercury, he employed a pasty amalgam, containing about two per cent of the alkali metal—this being about half saturated—for solid, hard, fully saturated amalgam of sodium contains but four to five per cent. A series of iron pans is set in a row, with a small Bunsen burner which can be moved from one to the other. A lump of sodium, averaging a third to a half ounce, is placed on the amalgam in one of these pans, with a little paraffine wax as a flux. The burner is then applied beneath, until the sodium, without any explosion, suddenly melts down into a thin cake of hard amalgam floating on the poorer amalgam below, which is itself liquefied by the heat of the reaction. This cake is removed with tongs to a ledge on one side of the pan to cool, and the next pan operated upon. Unless the number of pans is too large, the burner need be used but once with each of them, as the heat retained is sufficient to produce immediate combination. One operator could in this way make a thousand pounds daily of saturated amalgam without an explosion. The cakes are all melted together under paraffine in iron kettles, and cast into ingots or other shapes desired. To use the liquid alloy in this way some modifications will be required in the manipulation, which experiment and invention will readily evolve.

Second—A very little of such amalgam added to mercury was found by H. Wurtz to intensify so greatly the adhesion of the mercury to gold and silver that when these occur in ores in such forms as to be untouched by ordinary mercury, this prepared mercury instantly amalgamates and absorbs them.

Third—When mercury becomes "floured" or "sick," as it is called, a little sodium amalgam wholly cures it, and coalesces the detached globules instantly. The water in the apparatus slowly dissolves out the sodium, but it will be a very simple matter of invention, now that sodium is applicable with great profit to such ores, to devise plans of feeding the amalgam automatically to the battery and pans in minute graduated quantities.

Fourth—In alloying metals much trouble is often experienced through obstacles in the nature of such metals. Many such difficulties altogether disappear when a little sodium is present.

Fifth—Wurtz invented also the now familiar addition of sodium to various kinds of solders, and to baths for coating iron and copper with zinc ("galvanizing," so called), lead, tin and divers alloys.

Sixth—He devised a plan for removing the sodium and mercury (if present), when desirable, from such metallic coatings, by washing them out, so to speak, in a secondary

bath of the same metal. When this secondary bath becomes charged with sodium, it is used as a primary bath. The primary baths need not contain any mercury, as, with proper precautions the sodium itself may be incorporated directly with other metals.

The best "pickles" and fluxes for these widely varying operations of coating, etc., will become subjects of invention. We should warn experimenters that nothing can be done with *aluminum* in this field. Mercury destroys it rapidly.

The Old Dominion Copper Co.

Superintendent N. S. Berray has furnished the *Globe, Ariz., Silver Bell* the figures showing what was accomplished by the Old Dominion Copper Co. during the year 1893. It was, on the whole, a very unfavorable year for the copper industry; but, despite the low price of copper and the general business depression prevailing, the O. D. Co. makes a very satisfactory showing, due to a good mine and management.

The figures are as follows: Ore smelted, 63,597,300 pounds; lime used for flux, 14,618,208 pounds; coke consumed, 11,040,775 pounds; copper produced, 7,866,475 pounds, which is the second largest yearly output ever made by the company, having been exceeded, in 1892, when 8,019,059 pounds of copper was produced. The output during the fore part of 1893 was light, and the prospect for the year was further reduced by a suspension of about a month in the summer. That these losses were almost entirely made up during the last four months of the year is an indication of what could be accomplished with the Globe mine were the company disposed to increase the output. The development work done during the year amounted to 5620 linear feet, and the mine was never in better shape than at present, and the ore bodies show no signs of exhaustion. Also the smelting plant, cable tramway and other works are in a condition for efficient service. An important improvement made at the smelter was the introduction of the auxiliary windbox, now in use on all the furnaces, the value of which has been fully proven.

The management of the Old Dominion Copper Co.'s works is in good hands. Supt. Berray, during his long connection with the company, has worked in almost every capacity about the mine and is familiar with every detail of mine work. He has a capable assistant in the person of Louis B. Walker, whose technical knowledge is of great value. John Murphy and Wm. Ryan, who have charge of the smelting, and Frank Beston, foreman, and his assistants in the mine, are all old, trusted employes who understand their business. The company is fortunate in the class of men on its pay-roll, many of whom have been with them for years, and whose faithful services contribute to the company's success.

The Kennedy District.

Correspondence Winnemucca, Nev., *Silver State*.

Kennedy district is situated in an elevated, well-watered cove on the eastern slope of Clinch mountains, about 60 miles south of Winnemucca, from which place it can be easily reached by an excellent natural road.

In the lower portion of the cove we find the quartz mill, well-equipped restaurant, lodging-houses, barn and store—all substantial buildings and the property of W. T. Jenkins, who has already spent thousands of dollars here, and is now making arrangements for the erection of a roasting and smelting plant suitable for the more refractory ores.

The ledges of this district have a general north and south trend, dipping to the west at an angle varying from 45 to 80 degrees, and generally have a gangue composed of friable, decomposed ore bearing quartz. A few feet from the surface, water is usually struck, while the character of the ore assumes a material change, from what is claimed to be free-milling ore to a rebellious combination of great value. The well-defined, vigorous independence of the Kennedy veins from country rock, and other prominent characteristics of permanency, speak louder and plainer than words that nature's bandiwork intended that the ore fissures of Kennedy should remain as such. As a matter of fact submitted for serious consideration, the six square miles constituting Kennedy district are underlaid by an immense quantity of free-milling, roasting and smelting ores, ready to disgorge these treasures by proper metallurgical treatment, while in every instance the ore seems to increase either in quality or quantity with the depth attained. The dumps of Kennedy have considerable ore, showing the ready skill of the intelligent sorter and the indomitable energy of the untiring miner.

THE Southern Pacific is putting electric search lights on its engines up north, and the two Hogg engines running into Ashland, Or., are to be equipped soon. These search lights are very powerful and long-distance peepers into darkness, being able to throw a light for miles.

Artesian Wells as a Source of Power.

Abridged from Article in *Chicago Street Railway Review*.

Work has been quietly going on in South Dakota for the past year, which seems to prove that the artesian wells of the James river valley are as valuable and reliable a kind of water power as could be wished, and from all indications will continue to be so for years to come. Already a number of electric-light and flour-mill plants have been installed, and are in daily operation.

The artesian well district of South Dakota is located in the valley of the James river, covering a tract about 40 miles wide and 200 miles long. The James river is about half way between the Missouri and the eastern boundary of the State. The water-bearing rock is found at from 900 to 1000 feet from the surface. The first and most vital question that comes up is as to whether the supply is reliable, and can be depended on to continue with its present pressure, as more wells are sunk and a greater volume of water is drawn from the underground source.

There are good reasons for thinking that the supply is practically inexhaustible. These reasons are based both on the theories advanced by the United States government geologists and on observed facts in connection with the sinking of wells. The government theory is founded on the fact that the same stratum in which the water is found outcrops in the beds of the upper Missouri and Yellowstone rivers, and at the base of the Rocky mountains. The water, sinking in this porous stratum of rock, follows it for hundreds of miles, until tapped by the South Dakota wells. It has long been believed that there is more water in the Missouri river above the Great Falls than there is 30 miles below. For 25 or 30 miles below the falls the river bed is composed of the same sand formation in which the South Dakota wells get their water. If this theory is correct, as it probably is, the supply of water in these wells may be looked upon as inexhaustible—at least as much so as the sources of our Rocky mountain streams. Another fact that would point strongly to the truth of this theory is that during the June rise in the upper Missouri river the pressure in the wells rises. No diminution in pressure has been noticed in any of the wells in the district, except by clogging up with mud, due to improper piping. The city well at Redfield has been down seven years. Its pressure has been constant, although numerous other wells have since been sunk at no great distances from it. This well furnishes a direct pressure system of water works, supplying all the domestic needs of the city, and so great confidence is placed upon the pressure and supply that the fire department requires no fire engines. The closed pressure of this well is 177 pounds and cost for maintenance is absolutely nothing.

About a mile and a half distant is another well, used for running an electric light plant and for irrigation. A description of this well will suffice to give a fair idea of all. It is 1000 feet deep, and six inches in diameter from top to bottom. When closed, the pressure is 165 pounds. When allowed to flow freely through the six-inch pipe, it yields 207 gallons per minute, and rises to a height of 16 feet in the air. When the water is escaping through a two-inch pipe the well pressure is 128 pounds, and with a 2¾-inch opening 95 pounds. From this it is estimated that with a four-foot Pelton wheel, 80-horse power would be developed with a two-inch opening, and 100-horse power with a 2¾-inch. With the plain undershot wheel at present in place, 50-horse power is developed, and it is calculated that about 15 more is available with it. The flow is absolutely steady. This well cost about \$3000.

At Chamberlain a 150-barrel flour mill and light plant, formerly run by steam, is now using "well-power." These two plants were started in September, 1893. At Huron a well is about to be sunk by the city, for electric lighting purposes. The first electric light plant in the State, run from a well, is at Mellette, a town of 400 inhabitants. It is safe to say that very few plants in the world are doing a paying business in so small a place. This plant is thriving, however, and has connected to four-ampere arcs and 150 sixteen-candle power incandescents. The well is only four and one-half inches in diameter from top to bottom, but it operates, besides the electric light plant, a flour mill, which grinds 150 barrels of flour a day and 50 bushels of feed per hour. This work would require an engine of 40-horse power. The well is 910 feet deep. Its pressure when closed is 178 pounds. The flow is 1600 gallons per minute.

The outlay for an 80-horse power well is about \$3000, the interest on which would be \$2.25 per horse power per annum. This, with the interest and depreciation on the water wheel, is the only expense for primary motive power, aside from labor. A \$300 or \$400 building gives the wheel and dynamo a good shelter. The repairs to the water wheel ought to be almost zero, and the skill of the men employed for attendance does not begin to be that required in a steam plant.

Scientific Progress.

Photography in Astronomy.

In course of a lecture at Golden Gate hall, San Francisco, Jan. 18th, on "Photographic Revelations in Astronomy," Prof. E. E. Barnard, of the Lick Observatory, said:

"Very few persons have seen any of the results of advanced astronomical photography, save the well-known pictures of the sun and the moon. Indeed, it is the privilege of the few, and only then when they have access to the great telescopes and observatories of the world. I may say that photography has practically revolutionized astronomy, for by its aid and that of the spectroscopic we are enabled to see component suns that increase the power of the telescope on Mount Hamilton at least 25,000 times.

"As an illustration of the results of this class of photography, let me tell you that in February, 1892, Dr. Anderson announced that a new star was visible in the constellation of Orion. Professor Pickering of Harvard had made photographs of this region, but up to 1891 there were no signs of the presence of the stranger. However, on December 10, 1891, he discovered this star that had been recorded two months previously by an amateur astronomer, who used the photographic camera in the course of his observations.

"In October of the past year a Mrs. Fleming, who is interested in the observations made by Harvard College, detected a new star that had been affixed on a plate made in Central America. At the present time the rays of the sun have obscured this new star to such an extent that it is not visible, but the Harvard scientific party is still waiting at Arequipa to record its character when it emerges from the field in which it is at present hedimmed.

"Photography is also being applied to the discovery of other heavenly objects, and in the strange zone between Mars and Jupiter there are myriads of stars and kindred heavenly strangers that are constantly furnishing points of absorbing interest to those who study the field with the assistance of the camera.

"Last year, out of 50 discoveries, only one was made by the naked eye, and of the total number 35 were revealed to a single observer."

At this juncture Professor Barnard, with an assistant, used a stereopticon to illustrate the wonders and beauties of his subject, first showing the Lick Observatory in its shroud of snow, and again by moonlight and in a dense fog. He facetiously referred to his

next picture as a lamp-shade, but upon a closer study it was manifest to the audience that it was a faithful likeness of the sun as it sank on the crest of the ocean. Its eccentric form and luminous reflection gave it an apt resemblance to a transparent shade.

Again, the screen showed the sun with its spots and surrounding mass of incandescent hydrogen. The grouping of bright spots and granulated surface were distinctly defined and to the unscientific gave a bewildering insight to the dazzling surface of the orb of day.

"The heat of the sun is an unknown factor to scientists," said Professor Barnard. "According to their estimates it varies from 3000 degrees to 180,000,000 degrees. One authority says that were the entire coal supply of Pennsylvania placed within its radius, it would be consumed in the fraction of a second, while the glacial masses would be almost instantly turned to steam."

A photograph of the total eclipse of 1893, taken in South America, plainly showed the luminous corona of the great body. Then came the transit of Venus across the sun's surface, in which the planet's insignificant size was graphically displayed.

A magnificent view of the moon's area induced Professor Barnard to say: "On the moon there is no life, no water, no atmosphere. All is a desert. In the south pole region of the moon it will be seen that the craters are inactive and that the volcanoes are silent masses of desolation." In referring to the mountains, valleys, plains and other configurations of the moon, Professor Barnard defined the distances as accurately as he would refer to the area between San Jose and Mt. Hamilton. "One mountain peak near the south pole of the moon is over 40,000 feet high—a greater altitude than that gained by any eminence of the earth," explained the professor.

Referring to the planet Mars and its canals Professor Barnard said that, in spite of repeated claims, there is no accepted theory as to whether intelligent life exists on Mars. As an illustration of the extreme sensitiveness of the camera a view was displayed which showed a projectile being discharged from the Zallnsky dynamite gun. Its flight when caught by the plate was at the rate of 600 feet a second.

A group of views of the Milky Way were shown and explained in a highly interesting manner. They were followed by a photograph of the double cluster of Perseus. It was remarked by Professor Barnard that the photographing of the comet of 1882, made at the Cape of Good Hope, was the real incentive for further research in astronomical

lines by means of the camera. As illustrating the particular beauty of the skies, a view of the Pleiades, with their nebulous rims, was thrown on the screen.

As a comparison of the relative power of the telescopic camera and the human eye, a group of views plainly manifested the stupendous difference, and this was accompanied by a graphic showing of the Lick telescope traversing a starry field in search of astronomical phenomena. Professor Barnard gracefully concluded his edifying address by saying, "The heavens declare the glory of God and the firmament showeth His handiwork."

Sensibility of the Eye.

It seems probable that some information as to the degree of perfection of the refractive system of the eye, and as to the ultra-microscopic structure of the cones of the retina, might be derived from a comparison of the smallest intensity of light that can be perceived under different conditions. Thus the light of a star which is just visible has been shown to be equal to that of a candle at a distance of 27,500 feet. Here the source of light may be taken to be a point of absolutely inappreciable dimensions.

On the other hand, Aubert (quoted by Prof. McKendrick) asserts that the minimum surface luminosity that can be seen is one of three-hundredth the brightness of the surface of the moon. The *Optician* estimates that the image of the moon upon the retina forms a circle of about 2025 times the area of one of the central-cone filaments. The total light distributed over this area will be, it is well known, equal to that of a candle at 12 feet. And one three-hundredth of it will be equal to the light of a candle at 208 feet. The light received by each cone may, therefore, be put at one two-thousand-and-twenty-fifth part of this. It is that of a candle at only 9360 feet. For a point source which is not of insensible dimensions this would seem to be the lowest appreciable intensity of light, or it is so if we assume the retinal cones to act independently of one another in perception.



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Mechanical Progress.

An Improvement in Furnace Boilers.

At the fall meeting of the Alabama Industrial and Scientific Society held in Birmingham, November 24th, Mr. Murray, superintendent of the Linn Iron Works, described an improvement which he had been able to make in furnace boilers, whereby the use of a double-decked boiler with cylindrical mud-drum suspended beneath and a modification of the Spearman-Kennedy gas burner had resulted in notable economy.

Mr. Murray was obliged to dismantle a battery of boilers at the Alice furnaces, consisting of two 46-inch in diameter return-flue boilers 34 feet long. As these boilers did not give enough steam and the new boilers had to be put in the same space as occupied by the old ones, the problem had to be solved to secure the greatest heating surface in a limited space. The new boilers were built larger in diameter, and plain cylindrical heaters were added under each boiler. This new battery consists of two 54-inch return-flue boilers 34 feet long, each having two ten-inch flues. Under and connected with each boiler is a plain cylindrical heater 36 inches in diameter, 31 feet 2 inches long.

These heaters start eight feet from the front, giving room for the grate and the bridge-wall. The heaters pass through the back wall 2½ feet, and a 20-inch mud drum is suspended under the same on the outside of the brick work. The same setting, hangings and about the same brick work were used as in the old battery. The new double-deck boilers gave 1660 square feet of heating surface, as against 1040 square feet in the old style, a gain of 61 per cent. The supplementary heaters afford 59 per cent real gain. The increase of cost over the old system is only about 12 per cent.

Still better results were attained by introducing a separate jet of gas under the heaters, in addition to the one under the boilers. For this purpose Mr. Murray designed a new duplex gas burner. The upper burner is the ordinary Spearman-Kennedy burner. The lower burner is connected with the base of the upper one through a 9x9-inch cast iron pipe leading to a nozzle 24 inches by 3 inches. Air for combustion is admitted on either side of the battery through the hot walls, and envelops the gas jet at its orifice from all sides. The results with this burner were very flattering, and the same is now used by several of the furnace plants in that district.

Fire-Resisting Glass.

An interesting test of fire-resisting materials and construction was recently carried out in Berlin, under the auspices of the fire brigade and the insurance companies of the city, says the *Chicago Journal of Commerce*. The idea of the tests was mooted as far back as 1889; but there was considerable difficulty in arranging for a series of fires, which were intended to be as natural as possible and yet should not be dangerous. Finally, the municipality gave the experimenters the use of an old warehouse for their purpose; and this building, having been fitted up to represent various types of fire-resisting structures, was duly set on fire. Care was taken to subject the exhibits to the temperatures, irregularities of heating, sudden shocks by falling weights or jets of water, etc., which generally occur at conflagrations, and it was found possible to take fairly exact observations.

Among the most satisfactory results obtained were with the fire-resisting glass made by Messrs. Siemens of Dresden. The assessors declare it to be most suitable for any skylight or window necessary in a division between separate risks, as it will resist a temperature of 1300° C. for half an hour or more, bearing all manner of shocks and strains without suffering appreciable damage. Care is required in fixing this glass, how-

ever, as the iron frames generally used for the purpose buckle under heat and show, between the glass and iron, openings through which flame can pass. Some of the so-called fireproof floors made of iron girders and concrete came to speedy grief in these tests, while iron and brick floors stood very well. As regards fireproof doors, nothing stood better than double oak covered with thin sheet iron, between which and the wood there should be a layer of asbestos cloth.

Foundations in Quicksands.

At the International Congress of Engineering held in Chicago, Mr. F. Neukirch, of Bremen, read a paper on making foundations in quicksand. The sand on which the foundation is to rest is converted into solid concrete by blowing into it by air pressure powdered dry hydraulic cement. For this purpose a 1½-inch pipe is used, which is drawn to a point at its lower end and has three or more three-eighth-inch holes. This pipe is joined at its upper end by a rubber tube to an injector, which is connected to a source of compressed air, and is fed with dry cement.

The sinking of the pipe to the depth required is facilitated by blowing air through it during its descent and setting it in motion. Depth up to 19 feet can thus be quickly reached. This done, the cement is fed in and carried into the sand by the air, which, being forced up through the former, insures a thorough mixture of it and the cement. The tube is then slowly withdrawn, the supply of cement being continued until it reaches the surface. The concrete formed in this way takes several weeks to harden and requires some months to attain its full strength.

The whole area to be treated is divided into a number of small areas of about one square foot each. The tube being sunk successfully and operated on each of the squares, it is found that the mixture of the sand and cement produced occupies less space than the sand alone did before the operation. It has been used successfully in cofferdam work, also in sewer work, where it had to be laid in quicksand, it having proved highly successful in each case.

Another Smoke Consuming Device.

An ingenious German has invented a process which will in all probability win for him the gratitude of a long-suffering generation, says the *Ohio Valley Manufacturer*. He has devised a method the object of which is to remove the element of smoke from the combustion of coal; and so satisfactory have the tests been that the patentees have entered into contracts with some of the largest concerns in the country, including several of the principal lines of steamers. The coal to be used under this patented system is first reduced to powder by special machinery. This inflammable dust is projected into the current of air, automatically regulated, and as soon as it is inside it gives forth an intense blaze. Oxygen being introduced by an absolutely new contrivance, the dust does not fall to the bottom, but floats in space and is consumed to the last particle. There is never any smoke perceptible, nor any residue of ashes to be removed. The fire can be started or arrested in a moment, the pressure can be maintained at the uniform scale which may be required, so that practically there need be no waste of fuel, while the wear and tear of furnaces and boilers is greatly reduced. The invention is for manufacturing, smelting works, steamers and the like; it is not intended for private dwellings.

Aluminum for Engraving.

That aluminum can be successfully used for engraving in place of stone or steel plates has been successfully shown, says the *New York Sun*. The only stone used for lithographing is found at Sohlenhofen, Bavaria, and it grows more costly as the

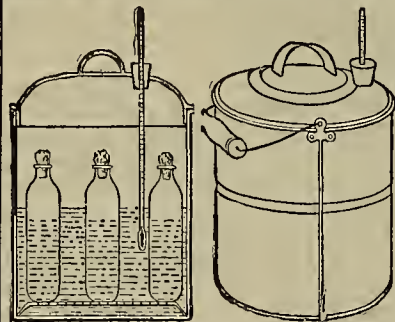
supply decreases. A stone 30x40 inches, weighing 500 pounds, costs \$100. It is very fragile, and, being rigid, can only be used on flat surfaces. Under a recently patented process it has been shown that aluminum plates, weighing from 2 to 10 pounds and costing from \$5 to \$10, do the work quite as well. Besides, the metal is not fragile, and, being flexible, can be molded into forms for cylinder presses. As a substitute for steel in plates, the special advantage is that, while 80 to 100 impressions can be taken from a steel plate, an aluminum plate will furnish 8000 impressions. A company has been organized to manufacture the plates, and it is probable that their use will soon be widely extended.

Useful Information.

Sterilization of Milk for Children.

At the request of the Secretary of Agriculture, the Chief of the Bureau of Animal Industry has furnished the following simple directions for the sterilization of milk:

The sterilization of milk for children, now quite extensively practiced in order to destroy the injurious germs which it may contain, can be satisfactorily accomplished with very simple apparatus. The vessel containing the milk, which may be the bottle from which it is to be used or any other suitable vessel, is placed inside of a larger vessel of metal, which contains the water. If a bottle, it is plugged with absorbent cotton, if this is at hand, or in its absence other clean cotton will answer. A small fruit jar, loosely covered may be used instead of a bottle. The requirements are simply that the interior vessel shall be raised about half an inch above the bottom of the other, and that the water shall reach nearly or quite as high as the milk. The apparatus is then heated on a range or stove until the water reaches a temperature of 155 degrees Fahrenheit, when it is removed from the heat and kept tightly covered for half an hour. The milk bottles are then taken out and kept in a cool place. The milk may



be used any time within 24 hours. A temperature of 150 degrees maintained for half an hour is sufficient to destroy any germs likely to be present in the milk, and it is found in practice that raising the temperature to 155 degrees and then allowing it to stand in the heated water for half an hour insures the proper temperature for the required time. The temperature should not be raised above 155 degrees, otherwise the taste and quality of the milk will be impaired.

The simplest plan is to take a tin pail and invert a perforated tin pie plate in the bottom, or have made for it a removable false bottom perforated with holes and having legs half an inch high, to allow circulation of the water. The milk bottle is set on this false bottom, and sufficient water is put into the pail to reach the level of the surface of the milk in the bottle. A hole may be punched in the cover of the pail, a cork inserted, and a chemical thermometer put through the cork, so that the bulb dips into the water. The temperature can thus be watched without removing the cover. If preferred, an ordinary dairy thermometer may be used, and the temperature tested from time to time by removing the lid.

This is very easily arranged, and is just as satisfactory as the patented apparatus sold for the same purpose. The accompanying illustrations show the form of apparatus described.

Brickwork in the Tropics.

Bricks, when stones cannot be obtained, must of necessity be used for certain descriptions of work in the tropics, says the *Architect*. Great caution should be exercised in their selection, as it is found that all bricks made near the seaboard with brackish water are exceedingly susceptible to the weather, and molder rapidly away when exposed. It is, therefore, advisable to make them at some distance from the coast, with fresh water, and, above all, to have them well and thoroughly burned, which, in these climates, where fuel is generally most expensive, is most difficult to insure. Near the seacoast in Brazil it is found necessary to protect all brickwork with plaster, which certainly serves its purpose exceedingly well. In the interior of the country well-burned bricks may stand for a few years, but ultimately it will be necessary to plaster them, or to give them a thick coat of whitewash from time to time. Tar, over a coat of whitewash, has been used with considerable success for the protection of brick buildings and other works of this material, and in localities where it would not be considered unsightly, it is certainly preferable in buildings on the side from which the prevailing winds and rains set in during the wet season, as it not only throws off the moisture on the outside quicker, but tends to keep the interior of the building freer from moisture than any other protection. Of two samples of brick taken from the same wall, built in 1790, in Recife, although not in any way protected by plaster or lime whitewash, one appears to be quite perfect, while the other is rapidly decaying, and shows the necessity of outward protection, as a general rule, owing to the all but impossibility of obtaining in large quantities thoroughly well-burnt bricks.

The Telephotos.

The telephotos is a new means of electrical signaling by night and day. It is the invention of Claudius V. Boughton, of Buffalo, N. Y. The theory of the telephotos was the production by electricity, upon a shaft of incandescent lamps of any candle power, of the symbols of the Morse alphabet and numerals, in dashes five feet in length, made with ten lighted lamps, and dots of three inches made with one lighted lamp, and with unlighted intervals of five feet between each, which would bring under the eye the complete symbol at once, and was intended for use at any points within vision between which the laying of telegraph wires was impossible or impracticable.

Amount of Paint Required for a Given Surface.

It is impossible to give a rule that will apply in all cases, as the amount varies with the kind and thickness of the paint, the kind of wood or other material to which it is applied, the age of the surface, etc., says the *Clay Journal*. The following is an approximate rule: Divide the number of square feet of surface by 200. The result will be the number of gallons of liquid paint required to give two coats; or divide by 18 and the result will be the number of pounds of pure ground white lead required to give three coats.

New Sounding Device.

An instrument has been invented for sounding the depths of the sea without using a lead line, says the *Chicago Journal of Commerce*. A sinker is dropped containing a cartridge, which explodes on touching the bottom; the report is registered in a microphone apparatus, and the depth recorded by the time at which the explosion occurred.

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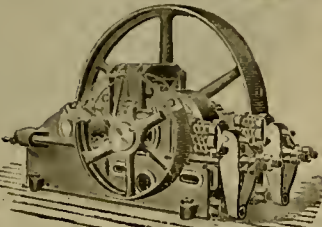
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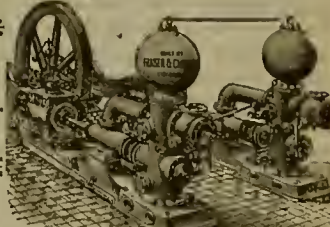
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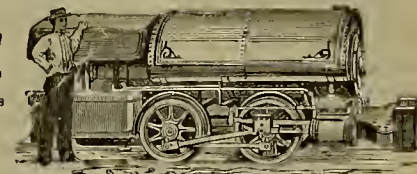
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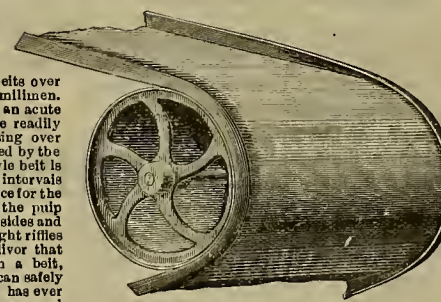
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Electricity.

Electrical Fire Risks.

The interior wiring of buildings is a far more fruitful source of fire than overhead wires, and this class of construction calls for correspondingly greater care than the former. It is only within the past three or four years that interior wiring has been made perfectly safe, and this result has been largely due to the efforts and restrictions of the fire underwriters. Many of the devices used in the early days of incandescent lighting, and which at that time were regarded as thoroughly safe, could not now pass the inspection of an insurance company in the country.

Most of all the fires due to the use of electric lighting have had their origin in some part of the wiring of the buildings, as it is almost impossible to start a fire from an incandescent lamp; and where arc lamps are in use for interior lighting, the globes and screens in general use render them very safe if ordinary care is exercised in keeping them properly trimmed. The chief danger here lurks in the hidden part of the wiring, where a fire may attain considerable headway before being discovered; but if electric wiring is installed in accordance with the best practice known at present, its fire risk would practically disappear. As almost every one familiar with the subject admits the possibility of making interior wiring perfectly safe, it follows that where fires occur from this source, the work must be defective in some respect.

Faults in interior wiring may be traced to defective insulation, bad materials or workmanship and insufficient capacity of the wires, all of which may be detected with competent inspection, and which are generally the result of too cheap work, says a writer in *Electricity*. The insulation of any house wiring can be fixed at almost any degree demanded, even without the use of materials other than those commonly employed, if the work is put in by competent persons. The use of tubing in which to run the wires is now general, and this tubing consists of a non-inflammable material covered with a metallic sheathing, with which a complete system of piping is run through the building in the same manner as the gas or water pipes, and is provided with suitable outlets for lamps, switches, etc. In addition to the insulation provided by the tubing, the wire which is drawn through it is itself covered with a good quality of insulation, and only wires of one polarity need be run in a single tube. With those precautions, and the lines between the various outlets of ample capacity to carry their maximum possible current without excessive heating, no possible danger can arise on this part of the system.

The next point is the connections at the different outlets at which junction boxes of incombustible material should be provided. These contain the switches and fuse blocks, in which sparking and melting of fuse wires will inevitably occur at times, thus strongly arguing the use of only the most approved appliances of this kind. The use of wood or any inflammable material in these appliances should not be tolerated, although the old-time wooden bases are by no means obsolete. The apparatus used now, enclosed in slate or porcelain, meets every requirement of safety, but even this may be troublesome unless it is set up with care and is properly used. The chance of poor connections, and the introduction of light resistances at these points, is always present when this work is handled by any but the most experienced and careful workmen. If these fuse blocks are not properly used in regard to the size of the fuse wire required for the current, their use becomes a mere farce. It is certain that a great many cases could be found to-day where, after the proper size fuse wire has been melted, it has been replaced by copper wire of perhaps several

times the capacity of the wire it was supposed to protect from overload.

The same difference in quality and make may be found in the electric-light fixtures as in the other supplies, but their quality has been steadily improving, and, if properly installed, are very safe.

Four Different Lights from Molecular Vibration.

Mr. Nikola Tesla has demonstrated that the phenomenon of light is producible in four different ways by the action of high frequency electricity upon suitable media, says the *Scientific American*. One of these methods is the incandescence of a solid, consisting of a small carbon button mounted upon a platinum wire in an exhausted bulb. When Mr. Tesla connected his body with one of the terminals of a high-tension transformer, and took an arrangement of this kind in his hand, the button became luminous. Next he took a highly exhausted bulb, containing a strongly phosphorescent body, above which was mounted a small plate of aluminum on a platinum wire leading to the outside, and the currents flowing through his body excited intense phosphorescence in the bulb. Thirdly, he took in his hand a simple exhausted tube, and in the same manner the gas inside the tube was rendered highly incandescent or phosphorescent. Finally, he took in his hand a metallic wire, which appeared covered with a luminous film through the intensity of the electrical vibration. Mr. Tesla is now engaged upon the problem of producing these effects with less expenditure of energy than was employed in the operation at first arranged by him. Either method of converting molecular bombardment into light without heat, provided that it could be done economically, would be a considerable step forward in the direction where "the light of the future" is supposed to await its fortunate discoverer.

Continuous Electric Furnace.

In a recent issue of the *Comptes Rendus* of the Paris Academie des Sciences, M. Moissan describes a continuous electric furnace in which materials may be melted out of contact with the carbon vapor of the arc. The body of the furnace is constructed out of bricks of lime, surrounding a central cavity. The sides of this cavity are lined with alternate plates of carbon and magnesia, the latter being next the lime, as, if the carbon plates were in contact with the lime, combination would occur at the high temperatures reached, liquid calcium carbonate being formed. The magnesia plates are irreducible by carbon, and hence can only waste away by direct volatilization. The cavity is closed with simple plates, above which is placed a block of lime. The arc carbons pass through opposite walls of the furnace, and the arc is struck between them in the center of the cavity. Below the arc, and above the bottom, a tube of pure carbon one or two centimetres in diameter passes through the furnace from side to side, and is inclined at an angle of 30 degrees to the horizontal. The ores to be fused are placed in this tube and the arc struck. The metal as reduced flows down to the lower end of the tube, where it can be collected. Using a current of 600 amperes at 60 volts, M. Moissan has produced an ingot of chromium of two kilogrammes weight. The fused metal was cast in molds of sesquioxide of chromium, to which it gave up any carbon it originally contained. The heated part of the carbon tube is transformed into graphite.

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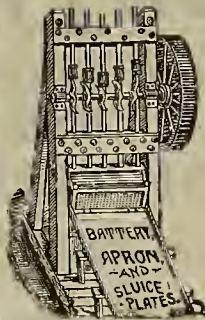
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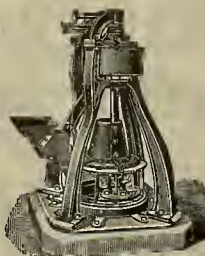
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Mining Summary.

The following is mostly condensed from journals published in the interior, in proximity to the mines mentioned.

CALIFORNIA.

Amador.

DRIFTS STARTED.—*Record*: At the Wildman mine drifts have been started at the 1300 level to tap the ledge. The station is cut out at the 1200, and operations will begin on that level next week. Superintendent Tregloan hopes to be getting out rock so that the mill can be started within the next four or five weeks. This will be good news to the force of men who were laid off three months since, when sinking from the 1100 level was begun.

STRAIGHTENING A SHAFT.—*Ledger*: A very hard piece of engineering is in progress at the Kennedy mine. This shaft is vertical 400 feet from the collar and from that point takes an angle of 56 degrees. This "corner" in the shaft has been a great source of expense on account of the wear and tear to ropes, track and skips and a decision was reached some weeks ago to reduce the angle by making a new shaft from 50 feet above the corner to about 50 feet below, the new shaft to be at an angle of 75 degrees thus making two easier angles for the skips to travel. The new shaft is about 100 feet in length and the point where it is farthest from the old shaft is about 18 feet. Thus it will be seen that a body of earth at least 18 x 18 feet, and wedged shaped 50 feet each way up and down the shaft had to be removed and the space occupied by it properly timbered. This work is not entirely complete, but on account of water and the fact that the north shaft is taxed to its utmost capacity, work was suspended on this improvement Monday and resumed later in the week. The preparatory work of laying out the plans of this improvement in the shaft was done by Master Mechanic Garbarini, while the execution of the work has been in charge of Foreman Trascott.

Mr. Wise of the Farrell has sent some fine samples of rock from his mine to San Francisco. They just made a cleanup in the mill, and will shut it down for a few days while Mr. Wise is absent upon a business trip in San Francisco.

Calaveras.

THE BLAIR.—*Echo*: The shaft on the Blair mine, at Smith's Flat, has reached a depth of over 210 feet, and very rich ore has been discovered. Cross drifts have been run east and west from the main shaft. Competent judges who have examined it pronounce it a valuable piece of mining property. The lead is represented as being nearly six feet wide and containing nearly 40 per cent of sulphurets of a high grade. The owners of this mine have spent a good deal of money in their endeavors to develop it.

Inyo.

REVIVAL LOOKED FOR.—*Inyo Independent*: There is every indication of a revival of mining interests in Inyo county. There are more men prospecting and new finds will surely be made. The Sorba mine is steadily producing good ore, and the more work is extended the more promising the mine becomes. The owners have already taken out enough ore to pay for the mine.

Mono.

STUCK IT AT LAST.—*Home Index*: Tbos. R. Rule has at last "struck it" in his claim at Mono Diggings, at the depth of about 70 feet. He went through a thick stratum of pipe-clay, which showed a little gold now and then. Under this he found genuine boulder clay. If he has really struck a channel that will pay, there will be hundreds of men at work in the old diggings next spring. Something like two millions in placer gold were taken out there in a short time, and its source has never been found.

Nevada.

THE GRANITE HILL.—*Telegraph*: Just now they "are getting in their work" at the Granite Hill mine. The ledge is getting to be a big one, and as we go to press the people who have charge of the mineral exhibit at the Midwinter Fair are rustling around to see the managers and owners of the mine to make an exhibit.

FINE ORE.—*Union*, Jan. 19: Some fine-looking ore, literally filled with gold, from the South Idaho mine, was being shown around town by Joseph O'Keefe, one of the principal owners. The company is working on the ledge which is two feet in size.

A NICE POCKET.—*Herald*: Another fine quartz specimen was found in the West Harmony Saturday, and Superintendent McCall will send it to the fair. It is a quartz boulder, found in the gravel. Upon breaking it open a pocket of beautiful gold was disclosed, light and flaky and as large as a hen's egg. Such boulders are being found right along in the West Harmony, and they are all put through the mill whether they look well or not.

NEW MILL STARTED UP.—*Transcript*, Jan. 18: The new quartz mill at the Spanish mine was started up yesterday. Everything works smoothly and satisfactorily and the stamps will be kept hammering away night and day on the fine quartz that is being taken from the mine. The mill is equipped with all the latest appliances, is conveniently arranged and most substantially built. Captain Nibell superintended the construction of the new mill.

AGAIN IN MOTION.—*Union*, Jan. 18: Last night about 8 o'clock the Idaho-Maryland pumping engine, which went through the recent fire, was set in motion and worked very satisfactorily, and will be kept running regularly until the mine is again clear of water. The mine is filled up to within 50 feet of the 1500-foot level, but it will be clear and dry in about two or three weeks if all goes well. The

insurance on the burned buildings and machinery of the Idaho-Maryland mine has been satisfactorily settled. The replacing of the buildings and machinery will probably be done by contract. Temporary sheds have been built for the use of the carpenters, engineers, blacksmiths and others at work at the mine, and everything looks favorable for the early resumption of mining in the depths.

Placer.

CRUSHING ROCK.—*Anburn Republican*: The new mill at the Three Stars mine is now crushing rock, and thus one of the most important mining enterprises in this part of the State has been entered upon. This mill is one of the finest in the State, and the property on which it is situated gives great promise of a future yield of the yellow metal. Success at the Three Stars means prosperity for the mining interests of the Ophir district.

THE HATHAWAY SALE.—*Republican*: Another big sale of mining property in the Ophir district, near Auburn, has just taken place, which means much for the future development and prosperity of that whole section. The sale just consummated is that of the Hathaway mine and Butts extension, the purchaser being R. R. Colgate of New York, and the consideration the sum of \$70,000. After making thorough tests, Mr. Colgate convinced himself of the worth of the property, and will go right ahead in his preparations to work the mine after the most approved modern methods. With two such mines as the Three Stars and the Hathaway in active operation, the Ophir district may expect an era of renewed prosperity.

Plumas.

BUILDING A DAM.—*National Bulletin*: J. H. Higinis has been building a restraining dam at Michigan Hill, to so enable him to operate his mine as to cause no fears that debris from it will reach the main stream. The structure is 297 feet long and will serve to impound a large amount of debris. As a matter of fact, the operation of this mine never has done any injury to the lower country, and the legal proceedings against it and the owner were persecution.

Riverside.

COAL AGAIN FOUND.—It seems as if there must be a considerable body of good coal in the Santa Ana ranges of mountains, south of town, says the *South Riverside Bee*. There are abundant indications of coal, and prospectors have at different times followed up small veins until their money or their patience gave out. The best result ever obtained was in Tin Mine canyon, where the Gilbert Brothers expended all their means. They developed an 18-inch vein of excellent coal. Their shaft filled with water and they had to abandon it. Several prospects are now being developed. Outside capital has been put into development of a claim owned by Judge Riche. The 50-foot shaft that had been put down has filled with water and a tunnel is now being driven. Several thin veins or stringers of coal have been out, and hopes are entertained that a good body will be uncovered.

San Bernardino.

BIG NUZZER.—J. D. Beam, Buynon Marsh and W. W. Wright, the three prospectors who left here, says the *Madera Mercury*, to prospect for a quartz mine in the newly discovered gold fields in western San Bernardino county, have returned. They brought with them a flat nugget which weighs 19 ounces and will probably assay about \$17 to the ounce. The under side of the nugget is smooth where it laid in the sand and the upper surface is irregular. The gold had been melted by volcanic action and was irregularly formed. It was found in a small wash in Goler canyon, about three feet below the surface of the ground. As all the claims in that country had been located, the prospectors did not prosecute their search very closely. Mr. Wright stated that the prospect for quartz mines is very poor. The ore is of a low grade and would not pay if it had been shipped to a mill. Water and wood are scarce, the prospectors having to carry a supply of both articles. They were forced to come back, as horse feed gave out. They will probably make another prospect soon.

TWO NEW MILLS.—*Vanderbilt Shaft*: The commencement of work by the two stamp mills now being erected will be the beginning of a new era in our camp. The number of men employed in the mills and mines connected therewith will be sufficient to make the payroll amount to \$10,000 per month, with only ten stamps in each mill. Besides these men there will be many other men who either have claims here or will lease parts of claims, and who will commence chloriding, as both mines will probably do custom work.

San Diego.

A NEW MILL.—The Escondido (San Diego county) Gold Mining Company has contracted for a 20 stamp mill, which is expected to be in operation at the mine by the 15th of February. The mine is proving very satisfactory, according to reports of those interested, and they hope to have some of the most improved machinery in operation there shortly. The ledge has widened to over five feet in thickness, and there seems to be a great deal of ore in sight.

Siskiyou.

NEW DITCH BUILT.—*Yreka Journal*, Jan. 17: Frank H. Hall, the enterprising operator in mines, has just completed a new ditch at Salmon river, and will start up work this week in operating the old Finley Tribe mine, recently purchased. The claim will be mined by the hydraulic process, with a good supply of water to continue until late in the summer, if not all year round.

The quartz mines at Oro Fino are turning out exceedingly well of late, and considerable

gold will be realized this season in that district. Rich strikes have been found in the Digglees claim, also in the old Banner claim and other ledges. The hydraulic claims are lying idle since New Year's in consequence of the cold weather freezing the water at the head of the ditches on in the high mountain altitude.

Some fine specimens of coal were brought into Yreka last Friday from the Siskiyou coal mine, at Willow Creek, for the Midwinter Fair. The owners are doing considerable work in opening this mine at present, and expect to realize a great amount of first-class coal during the coming spring and summer.

The warm rain of the past three days has filled all the streams and ditches to fullest capacity, and the hydraulic miners debarred last week from the effects of frosty weather can now start operations again on the most extensive scale, with water enough to use all the giants, and also ground sluice in uncovering the pay gravel at bedrock.

THE STORM A BENEFIT.—*Yreka Journal*, Jan. 24: The heavy rainstorm of a week ago, and the snowstorm of last Friday night, will be of great benefit to the mining interests, the rain having filled all the small streams and gulches, while the deep snow on the mountains will prove a valuable fountain in keeping up a good supply as it melts gradually every day until midsummer, if not longer.

We anticipate considerable work in the dry diggings and high gulch claims during the remainder of the winter and coming spring, as there is a great quantity of snow on the mountain summits to afford plenty of water for ground sluicing, especially when warm rains occur to melt the snow more rapidly.

The Greenhorn blus gravel mine is now supplied with an abundance of water, and a large force has been employed with good success in securing a much larger yield of gold each day. The water supply will last until late next fall, as there has been more rain up to date than during the entire season of most years, with the wet season only about half gone.

Sierra.

DELAYED BY SNOW.—*Nevada City Herald*: At the Idaho mine, near Alleghany, there are three feet of snow. The superintendent has a job of grading to do for the new hoisting works, and the snow is delaying the work.

In the Ruby mine, Sierra county, a very rich ledge has been struck which shows well in free gold.

John Fessler has bonded his mine at Chippis Flat for 60 days for the sum of \$30,000.

The Gold King has a five-foot ledge which is paying well.

Sonoma.

TAKING OUT QUICKSILVER.—R. E. Lewis, one of the principal owners of the Mount Jackson mine, southwest of Healdsburg, informed the *Tribune* that the operations continue on an extensive scale, there being 45 men on the payroll. Last month the production exceeded that of any previous month, and 154 flasks were the yield. The prospects for a continuance of such an output are good.

NEVADA.

Washoe District.

SUMMARY OF COMSTOCK OPERATIONS.—Following is Superintendent Lyman's official report of last week's work in the Consolidated California and Virginia mine: "1650 level.—In our workings in and from the drift run north from the foot of the upraise which was carried up from sill floor of this level we have extracted a few tons of ore of ordinary value. The drift running north from east crosscut 1 from the drift run north from the winze (down 52 feet) at a point 40 feet north from the winze has been advanced 32 feet; total length, 166 feet; face in porphyry and clay and quartz carrying a low assay value. East crosscut 2 from the drift run north from the winze (down 52 feet) at a point 126 feet north from the winze has been advanced 34 feet; total length, 42 feet; face in porphyry, clay and quartz. The total quantity of ore extracted from the mine during the week was 48 carloads, about 46 tons, averaging \$23.14 per ton. The largest portion of this ore came from our workings in the vicinity of the winze 20 feet down. The southwest drift (the Rule drift) from the 1000 station of the Consolidated Virginia shaft has been advanced during the week 60 feet; total length, 331 feet; face in porphyry, clay and quartz of nominal value. The bearing of this drift has been changed and the course is now 41 degrees west of south."

The weekly statement of Superintendent Kervin of the Best & Belcher mine is as follows: "200 level.—The north drift which was started in west crosscut No. 3, 175 feet from the main north drift, has been extended 12 feet and work discontinued; total length, 120 feet; face in porphyry and quartz. 900 level.—The east crosscut on the north line has been advanced 15 feet; total length, 283 feet; face in hard porphyry."

Following is a summary of the operations in other Comstock mines during the past week: In the Ophir, on the 1465 level, the north drift from the west crosscut is out 72 feet and is in soft porphyry and clay. The old central tunnel has been repaired for a distance of 155 feet from its mouth. In the Mexican mine the west crosscut from the upraise above the 1465 level is out 134 feet and the face is in a porphyry formation carrying clay separations. On the 900 level of the Union shaft the Union Con. and Sierra Nevada joint north drift from the joint west drift is out 377 feet and the face is in hard porphyry and small seams of clay. The Sierra Nevada south intermediate drift in Cedar Hill is out 373 feet and the face is in hard porphyry. In the Andes mine on the 420 level the north drift from west crosscut No. 2 is extended 8 feet and continues in ore of fair assay value.

In the Hale & Norcross mine they continue stoping ore from the winze below the 1300

level, and extracted during the week 14 cars of ore assaying \$30.23 per ton per car sample and 10 cars of ore of average assay per car sample of \$19.69 per ton. In the Chollar mine they have started a drift south 200 feet north of south line on the 100 level. Are repairing the north compartment in the main shaft below 850 level. Extracted and sent to the mill the past week 104 tons of ore from the 100 level. Milled during the week 120 tons. On hand at mill 73 tons. Average battery assays, \$20.52; average car-sample assays, \$23.36. In the Potosi mine the repairs to the west drift on the 450 level are completed and a drift south has been started. The east crosscut, 300 feet south of north line, 750 level, is out 82 feet; face in porphyry. Are repairing the south drift, 930 level. At the Ward shaft the west drift from the station, 820 level, is out 465 feet from the shaft; face in porphyry. They are still retimbering the old Alpha shaft.

Kennedy District.

PAOMISNO CAMP.—*Territorial Enterprise*: Kennedy district, in Humboldt county, is said to contain numerous veins of ore carrying gold, silver and lead in paying quantities. A stamp mill is to be erected there next spring. Below the water level the ore is said to change into high-grade sulphurets. There are seven ore-producing mines in operation in the district, and the ore extracted shows an average value of \$30 per ton. Kennedy & Co. have 800 tons of this grade of ore piled up at the mine. There are about 50 men employed in the district, and about the same number are idle.

White Horse District.

NOTES.—*Wadsworth Dispatch*: The Washoe tunnel is in 50 feet.

Teams cannot reach White Horse city and residents and visitors have to foot it.

The work on the Washoe is being pushed night and day, and something will happen before long. They expect to crosscut this ledge inside of two weeks.

The east drift on the 100 level of the Jim Blains is now in 25 feet, and it is expected to cut the ledge at between 35 and 50 feet.

Ferguson District.

BIG MINING DEAL.—A Denver dispatch says: Eben Smith, general manager of David H. Moffatt's mines, returned to-day from the Ferguson district, 50 miles south of Pioche, Nev. He has concluded the purchase of a gold property for \$500,000. Moffatt and his associates will take a half interest, and propose to spend \$200,000 at once in developing the property. They will put up their own smelter at a cost of \$50,000, as the mine is 200 miles from a railroad, and transportation of ore by wagon is impracticable. Smith reports an ore vein 26 feet wide, of which six feet averages \$120 a ton. The remaining 20 feet runs from \$18 to \$50. This district is on the proposed line of the new Nevada Southern Railway, which is being built northward from Gold's station, now Blake, Cal. All reports received in Denver indicate that there is an immense amount of gold in the now almost inaccessible region which this road is intended to traverse, and the confidential agents of the big mining men are going into it. The Smith-Moffatt purchase indicates that a new bonanza region will be opened next summer. It is not likely to be a poor man's country, as the railroad may not get through for a long time, and heavy capital is needed to insure profit.

ARIZONA.

AT DOS CABEZAS.—*Cor. Tombstone Prospector*: Four men upon the Philadelphia a short time ago got out about 65 tons and milled it in the 10-stamp mill here with such a result that they took in more men, and now have seven in all mining and hauling ore, and in a few days will start up on about 100 tons more.

The Casey Bros., on the celebrated Old Juniper, are working on good ore; in fact, all the mines, where persistent work is being done, show that we have some, at least, of the precious gold.

MACHINERY EN ROUTE.—*Tucson Star*: The machinery for the new Mohawk mine at Mammoth is en route for the mine with the William Neal teams. The plant is a new process, a grinder. It has a capacity of 40 tons a day, equal to 20 stamps. The plant will be set at the old Mammoth mill, so as to be run, for the present at least, by the power of the Mammoth mill. The mill will be run as the Mammoth has, by hauling the ore from the mine to the mill. The distance is four miles. It is probable, if satisfactory arrangements can be made, that the freighting will be done by the Neal outfit.

MONTANA.

TWO BIG DEALS.—*Butte Inter-Mountain*, Jan. 18: The Anaconda Company has purchased the Ramsdell-Parrot mine for \$65,000. The sale was made yesterday. This mine is a copper producer.

There seems to be no longer any doubt of the consummation of negotiations between Hon. W. A. Clark and English capitalists relative to certain of Mr. Clark's mining interests and the properties of Smith & Kessler, including the Clear Grit and Banker lodes. The negotiations have been carried to a successful termination by Mr. A. H. Wethey.

Smith & Kessler have sold out their interests and received the cash. Mr. Clark has not sold out, but is a part of the new concern. He has received a certain cash consideration for an interest in a group of patented copper and silver claims, and in addition to this the purchasers agree to build a smelter. It is said this will be a very extensive plant—as large as the combined capacity of the four smelters now in operation in Butte. It will be of the last modern design and the mechanical part will be operated by an electric plant.

In addition to this, the various mines acquired by this new deal will be equipped with large and substantial hoisting works. It

is asserted that by next October the new concern will be employing 2000 men. Mr. Wethey will be the general manager.

At the High Ore mine ore production was commenced to-day with a large force of men. At the Green Mountain, which has been working a light force of men the past few days on account of overproduction of ore, the force was increased yesterday. Men are at work at the Wake-Up-Jim getting the engines in condition and it is expected this mine will have a force of men at work next week. The "Jim" has been idle a long time.

OREGON.

RICH POCKET.—Jacksonville Times: W. B. Flamm, who found the rich pocket near Bald Mountain, in Jackson Creek district, a short time since, has received returns from the ore he sent below for reduction through Beekman & Reams' bank. There was between \$300 and \$400 in gold, and a small percentage of silver, which, while not as much as was reported, is a nice cleanup for a few hours' work.

WORKING A DRIFT MINE.—Ashland Tidings: Swinden Bros. are working a drift placer mine near Redland, Josephine county, this winter.

Adam Clark has a new two-stamp Elsmere mill on his claim on Sam's creek, and expects to have it running within a few days.

Jack Garvin who sold his one-sixth interest in the Golden Eagle quartz mine on Williams creek to Pelton & Neil a short time ago, is preparing to resume work on one of his quartz locations on Wagner creek.

T. A. Hill, the miner who first prospected the claim known as the Golden Fleece, on which the Moody and Flanagan mill has been erected, has sold his one-fourth interest in the mine to R. P. Neil; consideration, \$1000.

Owing to the bad roads the Ashland Mining Company only got ore enough down from the mine to run the mill 12 days last month, but with that cleaned up bullion enough to pay all expenses of the mine and mill and the work on the new 600-foot tunnel. The new tunnel ought to be completed now in less than two months.

J. E. Smith & Co. are having bad luck at their quartz mill on Klamath river. The new wheel in the river which they had all ready to start the mill with this week was taken out by the freshet of Monday. There was a 12-foot rise of the river, and the wheel had to go. They mean business, however, and will proceed to put up another wheel at once.

WASHINGTON.

ON THE SWANK.—Ellensburg Capital: A company of Duluth capitalists have been working the Green Tree claim on the Swank. They have lately located a great deal of ground, including some that has been held by the Swank Bedrock Flume Company. The company, after having an examination made by an expert, bonded the Beckhorn mine, owned by Ford, Smith & Kanp, for \$24,000. They will push work on it and, if it meets their expectations, it is their intention to erect a mill on the property in the near future. This, if carried out, will mean a great deal for the camp and for the county.

Van Drake & Taylor's Machine Works.

A. J. Van Drake, the well-known expert machinist of this city, has recently associated himself with Mr. Phillips T. Taylor under the above firm name. Mr. Taylor is an experienced mechanical engineer and draughtsman whose skill will give added efficiency in conducting the varied and particular kinds of work of which this firm makes a specialty, and which consists largely of new inventions, experimental tests and the finer grades of machinery of all kinds. Van Drake & Taylor have recently moved from their old place, 203 Fremont street, to the large two-story brick building, Nos. 523 and 525 Mission streets. Their works now occupy the entire upper floor, 40x70 feet square, well lighted and thoroughly equipped with careful workmen, increased motive power and the latest improved machinery obtainable for their purposes. With these enlarged facilities, they will be able to meet all requirements in their line.

It is of the utmost importance to inventors and experimenters that their models and fine work should be placed in the hands of experienced, skilled and trustworthy men who can readily grasp their ideas and execute them with precision; who can assist them over difficulties when they arise, and who will turn out their work with dispatch and economy.

That these qualifications will be found with this firm there can be no doubt. In addition to the above, Van Drake & Taylor carry a full line of dairy supplies, their salesroom and warehouse occupying the first floor of the building. Repairing cream separators and dairy machinery will also be a special feature of their business. See the advertisement in another column.

Coast Industrial Notes.

—San Jose has begun the work of providing for her unemployed citizens. Monday 100 men were given employment on the city streets.

—The surveyors under F. G. Brooks have completed the line from a point on Owens river, Inyo county, to the Alabama hills, a distance of about 21 miles.

—A special election is called at Seattle, Wash., for February, to decide whether or not the school district shall bond itself in the sum of \$250,000 to take up outstanding warrants.

—The recent storm was particularly severe about Victoria, B. C. Such weather had not been experienced in ten years. The San Pedro wreck was swept and it was expected to split in two before the storm ended.

—Spokane broke ground Tuesday for a new \$340,000 water works dam. There were speeches, and Mayor Powell turned the first shovelful of earth amid much enthusiasm. Employment for many will be furnished in this way.

—The Interstate Fair Association was incorporated at Tacoma, to carry out the project of holding in Tacoma next fall a big exposition, to be participated in by Washington, Idaho, Montana, Oregon, British Columbia and Alaska.

—The Seattle Board of Aldermen has passed an ordinance making it a misdemeanor for any person to keep or store within the city any explosive other than ordinary black powder, unless designed for immediate use in the city. Strict regulations are also made regarding the transportation of explosives.

—The great tunnel through the Santa Lucia mountains, which the Southern Pacific Company has been boring for more than a year past, was pierced Sunday morning. It is nearly 4000 feet long, and is one of the largest and most important tunnels in this country. Four short tunnels remain to be completed.

—W. A. Clark, millionaire mining man of Butte, Montana, and owner of the United Verde Copper Company's mines at Jerome, Arizona, has placed a corps of engineers in the field to survey a line for a narrow-gauge road from a point on the Santa Fe, Prescott & Phoenix railway to his mines, a distance of 28 miles. He expects to complete the road during the present year.

—About 11:30 o'clock Saturday night, Jan. 20th, 500 tons of earth slid from a bill at North Sausalito, near the North Pacific Coast Railroad shops, causing damage to the amount of several thousand dollars. Fences, sheds and barns were wrecked as if they were cigar boxes. After falling a distance of 80 feet it slid over 200 feet, carrying with it everything it struck, and the ground adjoining the moving mass was covered with slush six inches deep.

—During the past season the Watsonville beet-sugar factory handled 65,396½ tons of beets, from which 7768½ tons of sugar were made. There is yet a large supply of syrup on hand, which may be processed next year. This is the largest tonnage of beets handled and the greatest production of any beet factory on the continent. The season of 1894 promises to far surpass that of 1893. Already the contracted acreage has reached 12,000 acres, and the enlargement of the beet factory was a necessity.

Complimentary Samples.

Persons receiving this paper marked, are requested to examine its contents, terms of subscription, and give it their own patronage, and, as far as practicable, aid in circulating the journal and making its value more widely known to others, and extending its influence in the cause it faithfully serves. Subscription rate, \$3 a year. Extra copies mailed for 10 cents, if ordered soon enough. If already a subscriber please show the paper to others.

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey & Co., Pioneer Patent Solicitors for Pacific Coast.

WEEK ENDING JANUARY 16, 1894.

512,863.—FIBER SEPARATOR.—M. A. Glendard, S. F.
512,869.—FRUIT BOX.—W. T. Cottier, Los Angeles, Cal.
512,949.—DYING APPARATUS.—E. Desta, San Fernando, Cal.
512,823.—SECONDARY BATTERY.—A. Hough, S. F.
512,931.—CHIMNEY CAP.—M. Ludwig, Albany, Or.
512,781.—SHIPPING CRATE.—I. E. Marshall, Martinez, Cal.
512,840.—TOOTH MOLD.—J. R. Phelps, Marysville, Cal.
512,841.—TOOTH CROWN.—J. R. Phelps, Marysville, Cal.
512,838.—BOOM FOR DRAGS.—W. B. Pless, Stockton, Cal.
512,901.—FOLDING BED.—G. G. Richardson, Summerville, Or.
512,993.—FRESH WATER HEATER.—R. M. Scholzko, Tacoma, Wash.
512,894.—VOTING MACHINE.—J. H. Scotford, Portland, Or.
512,911.—TOOL HOLDER.—H. Shogren, Portland, Or.
512,918.—GOLD SEPARATOR.—M. Stewart, San Bernardino, Cal.

NOTE.—Copies of U. S. and Foreign patents furnished by Dewey & Co. in the shortest time possible (by mail or telegraphic order). American and Foreign patents obtained and general patent business for Pacific Coast inventors transacted with perfect security, at reasonable rates, and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

FIBER SEPARATING MACHINE.—Milton A. Glendard, San Francisco. No. 512,863. Dated Jan. 16, 1894. This invention relates to an apparatus for separating fibre and freeing it from dust and cellulose material. It is adapted particularly to separate the fibre of the cocoanut husk from the intermediate cellulose which grows with it and by which it is surrounded and enclosed. The apparatus consists of a series of independent rotating shafts having disks with teeth or projections upon their periphery and stationary bars with corresponding projecting plates between which the teeth pass, and means for delivering the material from one part of the apparatus to the other discharging the dust and cellulose. The result is effected by the concussion of the rapid blows caused by the moving of the rotating toothed disks between the stationary plates or disks, which breaks out and strips the filling material away from the fibre by the concussion. This separated cellulose escapes through holes or slits in the bottom of the casing and the fibre is carried forward through as many sets of cleaning disks as desired till it reaches the discharge opening.

ARTIFICIAL TOOTH CROWN.—James R. Phelps, Marysville, Cal. No. 512,841. This invention relates to artificial tooth crowns and consists in manufacturing the crowns with a metal base, band and backing, the object being to provide an improved method of preparing artificial tooth crowns with the backing and base attachments in readiness to be fitted so that the teeth and attachments may be kept in stock at all times ready for application with the minimum amount of fitting. It has been customary hitherto to manufacture the porcelain crowns or fronts ready to be used and these have been kept in stock; the fitting of the remainder of the attachments has been attended to when the patient called, and he would have to wait for all the necessary work of making the attachment and connecting it. In this device the whole thing is cast and connected with the tooth so that it is in readiness to be applied at once with very little work.

DENTAL MOLD FOR TEETH.—James R. Phelps, Marysville, Cal. No. 512,840. This invention consists of a mold and flask having handled jaws with the adjacent faces recessed and adapted to receive plaster of Paris or other composition from which the mold or matrix sections are made. These are made in various ways, having a dividing plate by which the two halves of the matrix are separated and the tooth is fitted into the matrix, after the latter is prepared, and held in place so that the metal to form the metallic crown can be poured down into the sections and surround the core which has been placed in position to receive it. The same arrangement of mold and matrix can be employed for casting the base and backing upon the tooth described in the other patent here noticed.

Assessment Notices.

OCCIDENTAL CONSOLIDATED MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Silver Star Mining District, Virginia, Storey County, Nevada.

Notice is hereby given that at a meeting of the Board of Directors held on the fifteenth day of January, 1894, an assessment (No. 15) of Ten Cents (10c) per share was levied upon the capital stock of this corporation, payable immediately in United States gold coin, to the Secretary at the office of the company, Room 69, Nevada Block, 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 15th day of February, 1894, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the 14th day of March, 1894, to pay the delinquent assessment, together with the cost of advertising and expenses of sale. By order of the Board of Directors, ALFRED H. DUBROW, Secretary.

Office—Room 69 Nevada Block, No. 309 Montgomery street, San Francisco, California.

FOR SALE CHEAP.

TEN 18" diam. suction and discharge

CENTRIFUGAL PUMPS,

WITH ENGINE ATTACHED.

—Together with—

NINE UPRIGHT BOILERS, 55" diam.

—Also—

TEN FOOT VALVES, and about 300 feet

of 18" diam. STEEL

FLANGED PIPE in 4, 8 and 12 foot lengths.

This machinery is practically new, and was built specially for use as a wrecking plant. The pumps have each a maximum capacity to deliver 60 tons of water per minute. The plant will be sold very low as a whole or separately.

These pumps are suitable for irrigating purposes or under any conditions where a large volume of water is required to be moved quickly and cheaply.

For prices and other particulars, address

MORAN BROS. CO., Seattle, Wash.

MAKE YOURSELF A
MINE FOREMAN,
Superintendent, Mining Engineer (Coal or Metal), or Successful Prospector by devoting your idle hours to HOME STUDY, BY THE METHOD OF THE CORRESPONDENCE SCHOOL OF MINES, SCRANTON, PA. To begin, Students need only know how to read and write. MODERATE CHARGES. SEND FOR FREE CIRCULAR.



TUBBS CORDAGE CO.

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Constantly on hand a full assortment of Manila Rope, Isal Rope, Duplex Rope, Tarrad Manila Rope, Hay Rope, Wharf Line, etc., etc.

Extra sizes and lengths made to order on short notice.

611 & 613 Front St., San Francisco, Cal.

QUICKSILVER

—FOR SALE BY—

The Eureka Company of San Francisco, Room 1,

426 CALIFORNIA ST., SAN FRANCISCO.

J. F. CROSETT,

628 Sacramento St., San Francisco, Cal.
Gold Mines Bought and Sold on Commission. Five first class meritorious mines now for sale at from \$25,000 to \$300,000. Correspondence solicited.

MINING AND SCIENTIFIC PRESS.
The Leading Mining Journal in America. Established 1890. Latest Discoveries in Science and Improvements in Mining and Mechanical Arts illustrated or described. A Standard Illustrated Weekly published at \$3 a year by GEWEY PUBLISHING CO., 220 Market St., San Francisco, Cal.

BAOR FILMS OF THE MINING AND SCIENTIFIC PRESS (unbound) can be had for \$3 per volume of six months. Per year (two volumes) \$5. Inserted in Dewey's patent binder, 60 cents additional per volume.

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Engineering and Shipbuilding Works.

MINING & MILLING MACHINERY,

ADAPTED TO EVERY DESCRIPTION OF MINING AND MILLING

OFFICE AND BRANCH WORKS,

213 FIRST ST., SAN FRANCISCO, CAL.

Market Reports.

The Markets.

SAN FRANCISCO, Jan. 25, 1894.

The silver market last Monday broke in London and New York, after having disclosed a weakening tendency for several days. On the last day of 1893 the London silver market closed at 31 1/4 per ounce standard, and 68c per ounce pure in New York. Monday London dropped to 30 1/4 d, the lowest official quotation on record there, though having touched the same on June 30, 1893. The New York price Monday was 66 1/2 c, or 1 1/2 c above the lowest recorded quotation. It will thus be seen that New York has apparently held up better than London, but the latter being the ruling market makes the New York quotation in this instance merely nominal. During the past week the London price has shown a net decline of 1/4 pence and the New York 1 1/2 cents.

Copper and Lead.

These metals have shown no change during the week.

The Quicksilver Trade.

The exports of quicksilver from San Francisco by sea in 1893 were 16,571 flasks, previously given in detail. During the same period the quantities sent out of the State by rail were as follows:

From—	Tons.
San Francisco.....	473
San Jose.....	39
Sacramento.....	17

Total..... 529

The above is equivalent to 11,755 flasks, and making a total of 28,326 by sea and rail, against 24,108 in 1892. The rail shipments were principally to Nevada and Colorado.

In 1893 there were 6450 flasks sent to New York by sea. A vessel now loading for the same destination will take 1000 flasks.

The local demand for this article is very small at present, and the recent restrictions put upon silver mining have greatly curtailed the inquiry from abroad.

NEW YORK, Jan. 25.—Following are the closing prices for the week:

	Silver in— London, N. Y.	Copper.	Lead.	Tin.
Thursday.....	31 1/4 69	10 00	3 25	20 00
Friday.....	31 1/4 68 1/2	10 00	3 10	19 55
Saturday.....	31 67	10 00	3 10	....
Monday.....	30 1/4 66 1/2	10 00	3 10	19 75
Tuesday.....	30 1/4 66 1/2	10 00	3 10	19 75
Wednesday.....	31 67 1/2	10 00	3 10	19 75

San Francisco Metal and Coal Market.

ANTIMONY.		QUICKSILVER.	
Per lb.....	@ 13	Home trade, pr. flask.....	31 00 @ —
Refined, in car lots.....	@ 71	English, do.....	@ 20
Powdered, do.....	@ 71	Quatu tool.....	@ 15
On contract, do.....	@ 71	3 1/2 Diam'd tool.....	@ 10
All grades jobbing at advance.....		Click & Hammer.....	@ 10
COPPER.		IRON.	
Bole.....	23 @ —	Spot.....	21 1/2 @ 22
Sheathing.....	23 @ —	Spot.....	21 1/2 @ 22
Ingot, jobbing.....	15 @ 20	Spot.....	21 1/2 @ 22
Do, wholesale.....	15 @ 20	Spot.....	21 1/2 @ 22
LEAD.		STEEL.	
Bar, base.....	@ 21	Spot.....	21 1/2 @ 22
Norway, base.....	@ 21	Spot.....	21 1/2 @ 22
PIG IRON.		STEEL.	
Eglington.....	18 00 @ —	Spot.....	21 1/2 @ 22
Oleungnook.....	18 50 @ —	Spot.....	21 1/2 @ 22
Am. No. 1.....	19 00 @ —	Spot.....	21 1/2 @ 22
Shots No. 1.....	19 50 @ —	Spot.....	21 1/2 @ 22
Shot No. 2.....	19 00 @ —	Spot.....	21 1/2 @ 22
Shot Lane White.....	19 00 @ —	Spot.....	21 1/2 @ 22
Langlois.....	22 50 @ —	Spot.....	21 1/2 @ 22
Oartherrie.....	22 50 @ —	Spot.....	21 1/2 @ 22
Barrow.....	22 50 @ —	Spot.....	21 1/2 @ 22
Caradoc.....	22 50 @ —	Spot.....	21 1/2 @ 22
STEEL.		STEEL.	
Pig.....	@ 41	Spot.....	21 1/2 @ 22
Bar.....	@ 41	Spot.....	21 1/2 @ 22
Sheet.....	@ 41	Spot.....	21 1/2 @ 22
Pipe.....	@ 41	Spot.....	21 1/2 @ 22
SHOT.		STEEL.	
Drip, sizes smaller than 1/2 in.....	@ 75	Spot.....	21 1/2 @ 22
Do, 1/2 in and larger sizes.....	@ 75	Spot.....	21 1/2 @ 22
Do, 1/2 in and larger sizes.....	@ 75	Spot.....	21 1/2 @ 22
Do, 1/2 in and larger sizes.....	@ 75	Spot.....	21 1/2 @ 22
Do, 1/2 in and larger sizes.....	@ 75	Spot.....	21 1/2 @ 22

Mining Share Market.

SAN FRANCISCO, Jan. 25, 1894.

Nothing of importance was developed in the Comstock market during the past week. The volume of trade was light and the fluctuations in prices were small, with a downward tendency. Some of the brokers whose office expenses are large are complaining, and are saying that, if business does not improve by February 1st, they will discontinue the use of the telegraphic stock indicators at or otherwise cut down the current bills.

Lower prices were the rule in the Comstock market Monday morning. In the Pacific Exchange, at the opening, Consolidated California & Virginia declined to \$3 25. At the San Francisco Board's first session the price fell to \$3 15. Afterward there were sales at as low as \$3, followed by a small reaction at 11:15 A. M. The other Comstock stocks acted in sympathy with the leading stock.

The Comstock market opened dull and heavy Tuesday morning, and in a short time went into a decline which continued up to noon. The commission brokers, who have been buying stocks on margins of from 20 to 50 per cent for customers during the last few weeks, were active sellers. Most of the purchases were made by operators who have been shorting the market. During the day, Consolidated California sold at as low as \$2 75.

The news of the boards yesterday and to-day was not of an encouraging nature.

Board Sales of Mining Stocks.

S. F. Stock Board.

THURSDAY, January 25, 1894.

9:30 A. M. SESSION.

100 Belcher.....	70c	50 Ophir.....	1.80
100.....	65c	5 Sierra Nevada.....	75c
50 C. O. & Va.....	3.05	51 Savage.....	65c
400.....	3.00	25.....	60c
500 Crown Point.....	1.90	300 Union.....	75c
100 H. & N.....	55c		

2:30 P. M. SESSION.

100 Andes.....	40c	100 H. & N.....	60c
200 Belcher.....	65c	100 Mexican.....	1.00
200 Best & Belcher.....	1.80	100 Ophir.....	1.75
350 Con. Cal. & Va.....	2.95	150.....	75c
450 Crown Point.....	1.90	300 Union.....	75c
150 G. U.....	70c	200 Yellow Jacket.....	70c

MINING SHAREHOLDERS' DIRECTORY.

Compiled every Thursday from advertisements in the Mining and Scientific Press and other S. F. Journals.

COMPANY AND LOCATION.		ASSESSMENTS.		No. AMT. LEVIED, DELINQ. AND SALE.		SECRETARY.	
Alpha Cons M & Co, Nev.....	12.....	10c.....	Nov 10, Jan 10, Feb 20.....	Chas E Elliot, Nevada Block			
Alta M Co, Nevada.....	11.....	10c.....	Dec 11, Jan 11, Feb 11.....	J E Jacobus, 329 Montgomery			
Chollar M Co, Nevada.....	10.....	10c.....	Dec 11, Jan 11, Feb 11.....	Chas E Elliot, 329 Montgomery			
Consolidated M Co, Cal.....	9.....	10c.....	Jan 11, Feb 11, Mar 7.....	Thos Lynch, 23 Montgomery			
Consolidated M Co, California.....	8.....	10c.....	Oct 3, Jan 12, Feb 1.....	W J Burnett, 308 Pine			
Confidence M Co, Nevada.....	7.....	10c.....	Dec 11, Jan 10, Feb 1.....	A S Groth, 414 California			
Crown Point G & S M Co, Nevada.....	6.....	10c.....	Dec 11, Jan 10, Feb 1.....	Geo R Spinoer, 310 Pine			
Dora G M Co, Cal.....	5.....	10c.....	Dec 11, Jan 10, Feb 1.....	Otto Tinn Sinden, 216 Bush			
East Sterra Nevada M Co, Nevada.....	4.....	10c.....	Dec 11, Jan 10, Feb 1.....	Robert McF Doble, Mills Building			
Ellipse M Co, Cal.....	3.....	10c.....	Dec 11, Jan 10, Feb 1.....	Chas G Harvey, Nevada Block			
Everett M Co, Cal.....	2.....	10c.....	Dec 11, Jan 10, Feb 1.....	Aug Waterman, Nevada Block			
Gray Eagle M Co, Cal.....	1.....	10c.....	Dec 11, Jan 10, Feb 1.....	K L Rosa, Sup Court Bldg			
Kentuck Cons M Co, Nevada.....	10.....	10c.....	Dec 11, Jan 10, Feb 1.....	Chas E Elliot, Nevada Block			
Martin White M Co, Nevada.....	9.....	10c.....	Dec 11, Jan 10, Feb 1.....	Chas E Elliot, Nevada Block			
Mexican G & S M Co, Nevada.....	8.....	10c.....	Dec 11, Jan 10, Feb 1.....	Chas E Elliot, Nevada Block			
North Conl & Curry G & S M Co, Nevada.....	7.....	10c.....	Dec 11, Jan 10, Feb 1.....	Chas E Elliot, Nevada Block			
Occidental Cons M Co, Nev.....	6.....	10c.....	Dec 11, Jan 10, Feb 1.....	Chas E Elliot, Nevada Block			
Ophir S M Co, Nevada.....	5.....	10c.....	Dec 11, Jan 10, Feb 1.....	Chas E Elliot, Nevada Block			
Osborn Hill M Co, Cal.....	4.....	10c.....	Dec 11, Jan 10, Feb 1.....	Chas E Elliot, Nevada Block			
Pine Hill G & S M Co, California.....	3.....	10c.....	Dec 11, Jan 10, Feb 1.....	Chas E Elliot, Nevada Block			
San Victor M Co, Mexico.....	2.....	10c.....	Dec 11, Jan 10, Feb 1.....	Chas E Elliot, Nevada Block			
South Eurola M Co, California.....	1.....	10c.....	Dec 11, Jan 10, Feb 1.....	Chas E Elliot, Nevada Block			
Yellow Jacket S M Co, Nev.....	10.....	10c.....	Dec 11, Jan 10, Feb 1.....	Chas E Elliot, Nevada Block			



Van Drake & Taylor, MACHINISTS AND MECHANICAL ENGINEERS, 523 & 525 Mission St., San Francisco.

SPUR AND BEVEL GEARS cut to order. PATENT MODELS and Experimental Machinery of all kinds. SHAFTING, PULLEYS and BOXES. ENGINES and BOILERS. DRAWINGS, PLANS and SPECIFICATIONS made for new machinery. JOBSING of every description promptly attended to. FINE WORKMANSHIP GUARANTEED. Also Pacific Coast Agents for the SHARPLES CREAM SEPARATORS.

PATENT Double-Acting Cornish Plunger. PUMPS TWICE AS MUCH WATER AS THE OLD PLUNGER. AN ENTIRE NEW SYSTEM OF PUMPING.

Weight of Machinery Reduced One-Half, besides doing away with 25 per cent less power. First outlay about one-third less. Suitable to any under or downrig shaft. Friction reduced to a minimum. Occupies less space in the shaft. Has been tested about a year and proved to work satisfactory in every respect. GUARANTEED TO GIVE SATISFACTION. Special attention is called to this new feature in the drainage of mines and raising water generally, by which a continuous discharge of water is produced on the up stroke and down stroke, instead of on the down stroke only, which is effected by very much less than one-half the weight of machinery now in use. When the ordinary pump becomes too small for the work it can be replaced by the new one, using the same rod and column, and doubling the discharge of water, a most important advantage in small shafts where there is not room for a larger pump. Apply to WM NANCE, Grass Valley, Nevada County, Cal.

Advertisement for Dewey & Co. American and Foreign Patent Solicitors. Established 1860. Office of the Mining and Scientific Press, Pacific Rural Press. No 220 Market St. Take Elevator No 12 Front St. SAN FRANCISCO, CAL.

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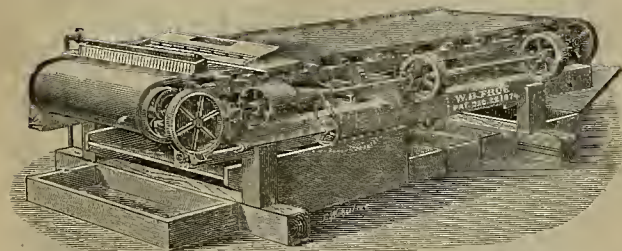
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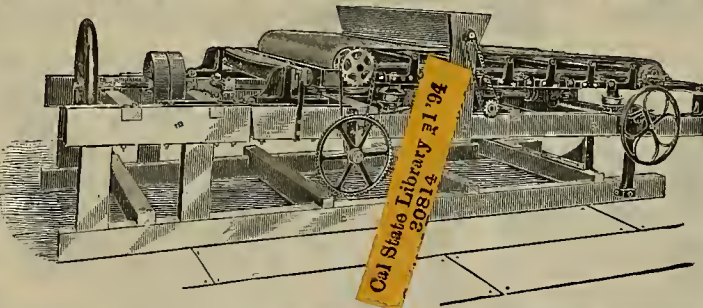
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VOLUME LXVIII.
Number 5.

SAN FRANCISCO, SATURDAY, FEBRUARY 3, 1894.

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Petroleum and a Tariff Duty.

California ranks sixth among the petroleum producers of the United States. The industry is growing, and the output is being steadily increased, so that in a few years it may be reasonably expected the State will surpass Colorado, and even West Virginia, as a producer. Its total for 1892 is estimated at 485,000 barrels; Colorado, 700,000; Ohio, 20,000,000; New York and Pennsylvania, 32,000,000. The market for the California wells is altogether at home. As a matter of fact, the great bulk of illuminating oil used on the Pacific coast comes from the East, about 2,000,000 out of 15,000,000 gallons consumed being refined in this State. The various wells are being worked to their full capacity, and, no doubt, as production increases the market will expand.

The Wilson tariff proposes to place petroleum on the free list; but it must be admitted that the probable action of Congress is not being regarded with more than passive interest by the petroleum interests of this State. There is a variety of opinion among the several companies as to the probable effect of the tariff, or, rather, absence of tariff. Some think it will be harmful, others not. It would seem that the threatened entrance into this market of the Peru product would arouse special solicitude for a tariff; but the other difficulties which the foreign product must encounter—so local concerns say—are so great that the tariff is but an insignificant factor. Recently published statements have been that J. W. Grace & Co. have agreed to land crude petroleum in this market at \$2.75 per barrel. There must be an error in this statement, for the Union Oil Company is said to be willing at any time to enter into a contract to furnish unlimited quantities of fuel petroleum at \$1.75 per barrel. The company has stored at Santa Paula about 75,000 barrels of the crude product, and delivers in Los Angeles for \$1.68 per barrel. The consumption of petroleum for fuel has been surrounded with such restrictions in this city that it has not an even chance to compete with coal. Only small quantities can be stored in one place. It must be underground. And altogether it has been at a disadvantage that has seriously interfered with its use. The Pacific Coast Oil Company now turns practically all its output into illuminating oil, and is able to make a profit by delivery in San Francisco at 9 cents per gallon in car-load lots.

If Grace & Co. are to enter this market, they will probably find—doubtless, they already know—that they must quote the crude product at \$1.50 per barrel, or less. It will take quite an expensive equipment to handle and store the petroleum, including tanks of large capacity, cars, wagons, offices, etc., and perhaps pipe-lines. These things involve the outlay of a deal of capital. Doubtless Grace & Co. know what they are doing. They have

already fitted out the steamer Bawmore, at considerable expense, for carrying the petroleum, and they are, of course, ready to do all else that is necessary. The result of their experiment will be awaited with much interest.

In course of an article giving advice to owners of prospects and partly developed mines, the *Plumas National*



FRANK MCCOPPIN, CHIEF OF THE MANUFACTURES AND LIBERAL ARTS BUILDING.

Bulletin very well says: Should a purchaser come around, owners should not ask two or three fortunes for prospects, thus defeating themselves and retarding the prosperity of the county. It is wiser for a man unable to develop and operate his property, to ask and receive a moderate price for his mine than to demand an exorbitant figure, make no sale and live in penury. Capitalists can afford to take chances, but the poor man is not in position to do so.

It is not yet fully settled that the miners will send delegates to Washington, to look after pending legislation of interest to California; but it is hoped that the necessary arrangements will soon be made and the delegates may start. Hon. Tiley L. Ford and Mr. Chas. G. Yale have been selected as the delegates.

Opening the Fair.

The California Midwinter Fair was formally inaugurated Saturday, January 27, in the presence of 72,000 people, and with appropriate ceremonies. It will now be open daily, Sundays included, until June 30; or perhaps the time may be extended to July 4, when the great exposition may terminate in a blaze of pyrotechnics.

It is not too much to say that the fair has exceeded all expectation. In extent, in picturesqueness, in variety and expense it is certainly the most pretentious aggregation of attractive objects ever gathered west of Chicago; and it is probably true that since the Centennial, and except the World's Fair, it is the finest exhibition seen in this country. The fair is by no means complete, or all that it will be; but the buildings are practically finished, and it can be but a short time until there will be order and precision where there is yet much confusion and irregularity. After March 1 will probably be the time to see the fair in its perfection.

The *PRESS* will from time to time present views of the fair and its chief features. We this week give photographs of two heads of departments who have done much to bring about the success already assured.

W. A. CLARK, the well-known Montana mining man, was in San Francisco a few days ago, having just returned from a trip to his United Verde copper mine in Arizona. Mr. Clark was interviewed by a local reporter on mining topics, and he gave expression to some few things that are worth repeating. In his opinion nearly all the substantial information on which to base the judgment as to the value and permanence of great mines has been acquired in the last twenty years. Before that much was conjecture and luck. Now, although luck figures sometimes in getting possession of a good mine, more depends on its management. The way of working, handling the ore, and the building of such mills as are properly required, test the judgment and skill. A man with good business qualifications, he says, is probably

more liable to succeed than any other; yet he ought to be a judge of a mine, know how to work it from a practical and technical experience, and have as definite a knowledge as possible of all these things. Mining is now reduced to a system. It is not what it once was. All of which is eminently true. Poor judgment and inexperience are the leading features of the history of mine failures. Hard common sense and experience count for as much in this branch of industry as any other.

THE Downieville *Messenger* announces that Mr. Phillip Deidesheimer has been awarded the first prize diploma and gold medal for "superior mine timbering" exhibited by him at the World's Columbian Exposition. His system of timbering used on the great Comstock lode in Nevada,

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San Francisco, February 3, 1894.

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Profit in Low-Grade Ores.

While Senator Jones' 250-foot Colorado ledge story (found in another column) sounds quite expansive, there is much food for reflection in his comment on low-grade ores in California and Colorado respectively. In California gold mining is on a bread-and-butter basis, and the search for bonanzas, if it has not altogether ceased, is not pursued as persistently as it formerly was. That is to say, the experienced investor is now satisfied if he finds a low-grade body of ore of sufficient extent and accessibility. Methods of treatment are now so exact that it is possible to make large profits out of such mines. The best paying properties are generally of that character.

If we are to judge from newspaper accounts, the situation in Colorado is quite different. The search is all for bonanzas. The bigger the story the better the advertisement for a particular locality. This is what may be described as the teething period of gold mining, for there is a good deal of slobber about it. Just the other day an enterprising correspondent in a Colorado camp sent far and wide a story that ore assaying \$78,000 to the ton had been struck in a certain mine! It is the design of Colorado to attract attention and capital. It desires to develop its gold fields, of which it unquestionably has many of great merit. But the sensible investor will hardly pin his faith to any such assertions. He must have an expert opinion, and he must have confidence in the expert. He wants to see the mill returns, or he wants the ore carefully sampled. He wants to know all that it is possible to know, before he buys. It is not possible that actual results will accord with these fabulous discovery announcements. The discrepancy, where great, will result in harm.

California has gone through all the various stages of gold-mining excitements. The industry is now on a business basis and in sound and healthy condition. We believe that its example may be imitated with profit.

It is proposed to hold in San Francisco, during the Midwinter Fair—probably in June—a mining congress, to which all the western States will be invited to send delegates. Arrangements are still altogether in embryo, but at this time it seems likely that it will be one of the most important gatherings of mining men that ever occurred in the west. Papers will be read on various mining subjects, and subjects of general interest taken into consideration.

THE operation of mining machinery by electricity appears to be making certain progress on the Pacific coast. The latest instance is that of the Tomlin mine in Madera county, which proposes to transmit power from a station three miles distant, the power being supplied by a 200-horse-power Pelton wheel. The mill is at a considerable elevation, and it is necessary to raise water about 800 feet to supply the mill. This will also be done by electricity,

River Improvement Delegates Before Congress.

The California River Improvement Delegation has had a hearing before the House Committee on Rivers and Harbors, at Washington, and presented arguments why immediate attention should be paid by the government to the Sacramento river and tributaries. The committee based its claims on the broad grounds of public necessity, and, so far as we know, refrained from touching upon matters which might have aroused the opposition of the mining interests.

The position of the delegation was wisely taken, considered from several points of view. Controversy was, on the one hand, avoided; on the other, the necessities of the Sacramento, Napa creek and Petaluma creek were placed on a common basis, in that all were in need of improvement of the same kind and all wanted their proportionate share of government attention. If the debris matter had been entered into it might have been troublesome to make clear to the committee that the filling up of the Sacramento river was due to one cause, and of these two creeks to another. These are matters upon which the so-called anti-debris interest has not been able to bring about a clear understanding of the differences if they exist; and, if not in this State, where the subject is best understood, what hope of making Congress believe that the "natural wash" (so called) filled up Petaluma and Napa creeks but has totally failed to act in the most inconsiderable manner upon the Sacramento.

The proper way for the river improvement committee to regard the matter was to take it as it found it and not to trouble itself about the unsettled question of cause. If the river bed is choked up, the true policy is to clean it out and not to attempt to show that certain interests or a certain industry was the source of the mischief. The committee appears to have taken the right view, and to have addressed itself solely to the task of showing what are the needs of navigation and dependent interests.

It is proposed to ask Congress for an adequate appropriation for rendering the Sacramento river navigable between Red Bluff and Redding; for improvement of the Feather river, and for the improvement of Petaluma and Napa creeks. Regarding the Feather river Mr. Ohleyer said, among other things:

"We only wish to carry out what has already been begun in the way of improving the navigation of this river, and rely upon the reports of the engineers in charge. I would ask for the building of two dams, as whatever debris can be prevented from entering the river is in the interest of navigation. The work already done is acknowledged to have been well planned and well executed, and the people I represent would like to see it carried on. The engineers have recommended restraining works at certain points along the valley, and also the straightening of the river at Shanghai bend. I recommend cutting off the sharp point which juts out into the river at that point."

J. M. Gleaves of Shasta, speaking in behalf of the Sacramento, said that the high freight charges of the railroad company practically prohibited the development of many Shasta county mining properties. He said that if freight charges could be reduced from \$8.70 to \$2 per ton, as it would be on the river if navigation was improved, many properties could be developed. He said that while the commission would like to ask for a large appropriation, they understood the condition of the national finances and would make their demands very modest. He asked that a snag boat be sent out as far as Redding this season. He argued that if this was done people on the river would do the rest for the present. There had been no estimate made between Red Bluff and Redding, but he thought about \$75,000 would be sufficient.

It is said that the river and harbor committee has practically decided that the total appropriation shall not exceed \$11,000,000, of which California shall receive only about \$300,000. It is hoped, however, that the efforts of this committee and the committee which is to go on for the miners may secure an increase of this meager sum.

One More Gold-Saving Device.

An Oroville mechanic has joined the long list of inventors who have constructed devices for the saving of fine gold. It is built on much the same lines as others, but presents one or two features that are novel. As described in the Forbestown *Mining Era*, the dirt is dumped on a swinging platform, set on an incline sufficient, with a small head of water assisted by the swinging motion of the platform, to cause it to pass into a long, slim box, also set on an incline, which has several sets of riffles. This box has the movement of a rocker, and the dirt, as it passes from the platform, falls upon the first riffle. The gold, sand and small gravel drops through to an apron (the heavy gravel passing over) which overlaps the second

riffle, and the water and constant rocking carries the debris and what gold is not caught under the first riffle down through or over the second, and in a like manner over several others, each of which gives the gold a chance to settle. The coarse material passes out of the rocker, over a grizzly and is dumped, while the sand and gold, if any of the latter has passed the riffles, falls into another box with several departments, lined with plates. Here it is agitated by small streams of water coming in at different directions under a pressure, until all has been brought against the surface of the plates, when the debris passes from the machine.

It is claimed that no quicksilver can escape, and that the finest and lightest scale gold, not saved in the riffles, cannot escape the plates in the last box. The motion to the machine is supplied by the water before it reaches the platform, so it requires but little water to operate it—five inches being estimated as a great plenty.

The inventor intends to give the machine a practical trial on some of the surface ground near Oroville, where the gold is exceedingly fine, and if it comes anywhere near the expectations of its owner a number will be built for operation near that town.

A Colorado Invention.

The Denver papers have recently contained enthusiastic notices of an invention, by E. R. Holden, for the treatment of low-grade gold ores, and particularly for extracting gold from placers. Descriptions of the device are, unfortunately, imperfect, and are indeed not descriptions at all. It may be interesting, however, to reproduce part of what is said about the process, omitting the altogether too abundant adjectives:

The process is a solution of the problem of treating low-grade gold ores, the principle being based upon a law of nature (gravity), coupled with mechanism to take advantage of this law. It is said that placer dirt can be handled for less than 25 cents a ton, and every trace of gold abstracted from it. The great trouble in all known processes and devices heretofore used has been due to the fact that fine gold, or the gold that had an oxidized coating of iron or other solution upon its surface, was not in a condition to be amalgamated, and on account of the low value per ton of the material it has been practically valueless. The new process claims to overcome all these objections.

The process consists of a very inexpensive apparatus, thereby placing it within the power of every poor man to operate for himself, and removes the necessity of placer owners being obliged to spend many thousands of dollars to secure hydraulic pressure; and in cases where no water can be obtained still enables the owners of the placers to operate without its use, except to a very limited degree, as no water pressure of running water is required for the operation of this process.

It is interesting to notice that this invention proposes to do away entirely with hydraulic mining, and relegate the famous "giant" to a place among the relics of an "effete past."

Mr. Holden will shortly receive letters patent from Washington, and will be able to show his friends a model of his invention in a few days. He will not handle the invention himself, but will let others take it off his hands in the way of State rights.

The Denver *Mining Record* was asked to give an opinion of the invention, and it complied in the following language: "If we understand the principle of this machine correctly, it works on the gravity system, the gravel and gold being dropped into a tank of still water about 20 inches deep. Upon the principle of specific gravity the gold is supposed to part company with the silica and sand as soon as the water is reached, the gold passing through the water to the bottom of the tank in about one-third of the time required for the waste. The principle will work on coarse gold, but flour-fine gold and leaf we do not believe can be saved by any gravity principle. It will not reach the bottom of the tank as quickly as the waste matter. Experiments have proven this to be true, and we believe that Mr. Holden's machine will be a failure for saving flour and flake gold."

THE Old Dominion mine at Colville, the most important mine in the State of Washington, which has been operating steadily during the recent silver depression, has at last been compelled to close down. For a period of eight years a large force of men had been steadily employed, the monthly payroll being a little less than \$10,000. President Dennis says that not another drill will be struck nor another blast fired in the Old Dominion until silver reaches the price of \$1 per ounce in the open market of the world. It is to be feared, then, that the mine will be idle for some time.

Progress of the Precious Metal Industry in the United States Since 1880.*

By S. F. Emmons, of the U. S. Geological Survey.

A review of the conditions governing the production of gold and silver in the United States during the past decade is more difficult to make, and, at the best, necessarily more incomplete than that of any other of our mining products, for the reason that the United States Geological Survey was not allowed by Congress to include these metals in its annual investigation of the mineral resources of our country. The Bureau of the Mint, which furnishes the most reliable data as to the aggregate production of these metals, is not so organized as to be able to segregate these products by mining districts, or even by States, in a complete and accurate manner, nor to furnish such technical data as are necessary for an intelligent study of the underlying causes which have governed the variations in the product of these metals.

Gold is the only important metal that is found in great measure in the native or metallic state, and comparatively free from other metallic combinations. Silver, on the other hand, is almost universally found in nature more or less intimately combined with baser metals from which it must be separated by a relatively expensive process in order to be reduced to the metallic state. Gold, again, is largely produced from placer deposits—detrital gravels and sands resulting from the disintegration of gold-bearing rocks and veins—in which atmospheric agents have concentrated and prepared it for man's use, so that it can be extracted by simple processes requiring but little technical skill or scientific training. The reduction of silver from its ores, on the other hand, requires in most cases not only the highest degree of technical and scientific knowledge and experience, but to render available any but exceptionally rich ores involves the expenditure of large capital in smelting plants, centrally situated and with easy and cheap railroad transportation to and from mining districts and coal fields.

The history of the development of unexplored regions rich in the precious metals follows with comparative regularity certain general lines. Gold is first discovered in the sands of the streams, and if these lead to rich and readily accessible placer deposits, a "boom" sets in and results in a very rapid increase in gold production, from the fact that large numbers, not necessarily expert miners, can work at them and no great preliminary expenditure of capital is required. With the rapid exhaustion of the richer and more easily worked placers, many abandon mining altogether; others search for new fields and for the veins from which the gold has been derived, and deep mining gradually replaces placer mining. This, however, is of relatively slow development, requires outside capital, and is more dependent on transportation facilities. Production for a time falls off, and increases again with the discovery of rich mines and consequent attraction of outside capital, which itself increases transportation facilities. This increase in production is slower than that due to the discovery of virgin placers of unusual richness. The prospector, who usually gathers his knowledge of ores not from previous training, but from practical experience in the field, searches first for the more readily recognizable gold ores and only as circumstances increase his knowledge for the more complicated and obscure silver-bearing ores. This progression is illustrated in the broad general features of production of the precious metals in the United States. When Whitney wrote his *Metallic Wealth of the United States*, in 1854, the financial conditions of the world were being seriously disturbed by the almost simultaneous development of the placer mines of California and Australia, which together had added at a bound \$120,000,000 to the world's annual production of gold without any corresponding increase in the product of silver. At that time, and for many years afterward, there was "no proper silver mine" within our territory, and it is hardly to be wondered at that he considered, in the light of the world's experience up to that time, silver to be better adapted for a standard of value than gold, since it appeared to be less susceptible to violent fluctuations in its production.

The production of the precious metals in the United States during the decade 1850-60 was practically all gold, averaging over \$50,000,000 annually, and mostly derived from placers; while of the less than \$100,000 average annual product of silver the greater part came from gold alloys.

In the early part of the decade 1860-70 the gold product fell off to \$40,000,000, but increased again to \$50,000,000 toward the end, the more complicated hydraulic mining replacing placer workings, and vein mining becoming gradually more developed. The first great silver producer, the Comstock lode, was opened during this decade,

and from this and other smaller bodies of rich silver ore, whose discovery was a more or less direct consequence of its development, the silver product increased gradually during the decade from \$1,000,000 to \$10,000,000. Toward the end of the decade the first great silver ore bodies in limestone were discovered, the first smelting works in the western mountain region were established, and the first transcontinental railroad line was built—circumstances which were to have a most important and far-reaching influence upon the mining industry.

During 1870-80 the mining industry was gradually being established on a more permanent and business-like basis through the introduction of improved methods and machinery and the increase in transportation facilities. Placer mining was almost entirely conducted on the hydraulic system, which involved a considerable investment of outside capital and the concentration of the workings into fewer hands. Prospectors were turning their attention more and more to the discovery of base-metal ores whose principal value is in silver rather than gold, and which, being more likely to develop in great bonanzas like the Comstock, were hence more attractive to capitalists. Gold mining proper settled down to a comparatively regular output, but the gold product of the country was kept up by the Comstock lode, two-fifths of whose bullion value was in gold. This remarkable deposit reached the climax of its product during the decade, contributing during five years an average of \$25,000,000 to \$30,000,000 annually to the precious-metal product of the country. The silver product during the decade increased steadily from \$12,000,000 to \$30,000,000, while that of gold fluctuated between \$33,000,000 and \$50,000,000.

The opening of the decade 1880-90 witnessed the final transference of the center of activity of mining in the West from the Sierra Nevada to the Rocky mountains. The bonanzas of the Comstock lode had been exhausted, and its deeper workings were soon to be abandoned as unprofitable. The reduction in the silver product caused thereby was more than replaced by the recently discovered silver-lead deposits in limestone of the Leadville district, which, however, carried little or no gold. The ultimate importance of the discovery of these ores, and of the many similar ones since opened as a direct result of the teachings their development has afforded to the mining community, has been shown in the enormous development of the smelting industry, and the concomitant opening of coal fields and the building of railroads in every direction through the mountain region, which, in turn, have stimulated the opening of silver mines carrying mixed or low-grade ores wherever they could be found within reach of railroads.

The characteristic feature has been the increase of railroad facilities throughout the mining region and the enormous development of the smelting industry, which is thus far the highest development of technical skill applied to the extraction of the metals from their ores. It forms the final step in the progression from the rude pan-washing of the placer worker, through the Little Giant and riffle-boxes of the hydraulic miner, to the more or less complicated crushing by stamps or pulverizers and subsequent amalgamation, with or without the addition of chemicals, and aided in special cases by various lixiviation processes. But, without the aid of metallurgical processes, carried on in a scientific manner and aided by large capital, the greater bulk of the ores that have been reduced within the last decade would never have been extracted from their rocky beds.

The decade has been one of great commercial prosperity in our country. Capital has been abundant, and has gone freely into new enterprises. It is only in such times that mining flourishes; for, on account of its hazardous nature, it is the last sought by capital. On the other hand, the investment of capital in railroads and smelting plants is a permanent one, which can not be withdrawn without great loss, and which therefore encourages the investment of other capital in tributary mines to make profitable that which is already invested. It is evident at a glance, therefore, that general industrial conditions have been such as to stimulate mining enterprises during the decade, especially such as require large capital.

The Silver Question in Peru.

Sir Charles Mansfield, English Minister at Lima, in a recent report on the trade and finances of Peru, mentions that the country is materially affected by the silver question, for Peru is silver producing, and has an inconvertible silver currency, with no paper. The exchange of the sole follows exactly the current price of silver. The depreciation of the currency has been a topic which has been much discussed in Lima. A gold standard is advocated on all sides, but this solution is impracticable in a country where the government has credit neither at home nor abroad, and where the finances are in a chronic state of irregularity.

Stickney Process of Roasting Ores.

Chas. W. Stickney, of Ketchum, Idaho, has obtained a patent for roasting ores.

Claim.—1. The process of roasting ores and depositing the sulphur in a solid form by bringing steam in contact with the ore at a red or higher heat, agitating the ore, reducing the temperature of the gases, mixing them with a quantity of air sufficient for the oxidation of the hydrogen but insufficient for the oxidation of the sulphur, and combining the oxygen of the air with the hydrogen of the gases by subjecting the mixture to the action of electrical discharges, substantially as described.

2. The process of roasting ores and depositing the sulphur in a solid form by bringing steam in contact with the ore at a red or higher heat, agitating the ore, reducing the temperature of the gases, mixing them with a quantity of air sufficient for the oxidation of the hydrogen but insufficient for the oxidation of the sulphur, and combining the oxygen of the air with the hydrogen of the gases by bringing the mixture to a red heat, substantially as described.

3. The process of roasting ores and depositing the sulphur in a solid form by bringing steam in contact with the ore at a red or higher heat, agitating the ore, reducing the temperature of the gases, mixing them with a quantity of air sufficient for the oxidation of the hydrogen but insufficient for the oxidation of the sulphur, combining the oxygen of the air with the hydrogen of the gases, and spraying the residual gases with a sulphate solution, substantially as described.

Foundry Notes.

The Felton Engineering and Shipbuilding Works are constructing six 34-foot sectional Huntington mills for a mine in Mexico.

The Union Iron Works are constructing a 20-stamp mill for the Good Hops Mining Company, Riverside county. The property has recently passed into the hands of a new company—as reported in the Press—and it is proposed to develop it on a large scale. Dudley Porter, John L. Hobson and Charles W. Morse, of Massachusetts, are principal owners, and Col. John M. S. Egan is superintendent.

Among wheels recently furnished by the Pelton Water Wheel Company are the following: Four wheels to the Columbia Gold and Silver Mining Company, near Newcastle, Placer county—one for hoist, one for mill, one for compressor, one for pump; one wheel for 10-stamp mill at Gold Ring mine; one 60-horse power wheel for the San Vicente mine in Sonora, Mexico, for a ten-stamp mill; 75-horse power wheel for a coffee plantation in Guatemala, for electric light, driers, etc.; 60-horse power wheel and Gates crusher for Quien Sabs Mining Company, in Nevada City.

The California Wire Works has recently erected at the Utica mine, Angels, Calaveras county, a ropeway for the transmission of sulphur from the mills to the two chlorination works. The length of the ropeway is 1550 feet, the rope being 7-inch diameter, with a total length of 3100 feet. It is operated by a 5-horse power Pelton wheel, and has a capacity of 60 tons per day. The total sulphuret production of the mine, however, is only about 17 tons, so the ropeway is in active operation only about two days each week. The construction was under the superintendence of Mr. E. I. Parsons.

The Southern Pacific road has sent a requisition to New York for twenty-one new engines, all of mammoth design, which will be used in the passenger service in the Tehachapi, Sierra Nevada and Siskiyou mountain regions. The Southern Pacific Company designs its own engines, after which the plans and specifications for the same are submitted to the various locomotive works of this country and bids are received from the several competitors. The estimated cost of these engines is about \$250,000, and they will embrace in their construction all the recently invented features in locomotive building which have been made. The principal object kept in view in designing these monsters has been to secure the greatest amount of power and speed combined. The engines designed are, as has been stated, of exceptionally large size, as the following description will indicate: The cylinders are 19 inches in diameter, 24-inch stroke; the drivers 63 inches in diameter, with 34-inch tires. The weight of each engine loaded will be 130,750 pounds; weight on truck, 25,850; on drivers, 104,900. The engines are what are known as the 10-wheel type and will have a maximum speed capacity of 60 miles per hour.

The bids for the construction of the steam boilers in the basement and the new dome of the San Francisco city hall have been opened and found to be as follows: Contract 54, brick work—McGowan & Butler, \$42,900; J. K. Phillips, \$39,130; Peacock & Butcher, \$34,000; Wald Tharp, \$26,330; Dennis Jordan & Son, \$29,680; M. Fennel & Son, \$33,399; Riley & Loane, \$38,000; F. A. Williams, \$40,275.

Contract 55, terra cotta—A. Steiger & Son, \$105,100; Gladding & McBean, \$97,950; Union Press Brick Company, \$108,000; Constable & Hamilton, \$110,000.

Contract 56, steel and iron—Risdon Iron Works, \$110,000; T. D. Warwick, \$38,925; Ralston Iron Works, \$96,150; Western Iron Works, \$105,600; J. McMullin, \$91,900; Constable & Hamilton, \$99,000.

Contract 57, cast iron—Vulcan Iron Works, \$3816. Entire dome and tower bid—J. H. McKay, \$230,580; O'Connell & Lewis, \$221,950; Constable & Hamilton, \$253,600.

Contract 58, boilers—Atlas Works, \$4150. The Risdon Iron Works made six separate bids, as follows \$3200, \$4650, \$2660, \$3810, \$4100, \$5140. Felton Iron Works, three bids: (a) \$8950, (b) \$8250, (c) \$4250. Parks & Lacey Co., three bids: (a) \$3520, (b) \$6130, (c) \$5180; also steam-drum, \$300. George H. Tay & Co., \$4700. Monahan & Aikens, (a) \$5610, (b) \$3410.

*Abstract of a Review of the Precious Metal Industry in the United States, contained in the "Mineral Resources of the United States."

Slickens.

It is rumored that there is to be a change in the superintendency of the Suto tunnel.

The Colliery Engineer, in its issue for January contains an appreciative sketch of the late C. H. Aaron.

CALIFORNIA ranks first in gold and grapes, second in sheep and wool, third in hops, fifth in wheat, and eighth in silver.

SAMPLES of wonderfully rich gold-bearing cement and lava have been taken from the land of Joho Cardwell near Folsom.

MR. A. S. HALLIDAY, of the California wire works, has gone to the city of Mexico on business. He will be gone about two weeks.

HON. J. F. KILDER of Grass Valley is being spoken of as the Republican nominee for Lieutenant-Governor at the coming election.

MR. L. C. TRENT, of L. C. Trent & Co., prominent dealers in mining machinery at Salt Lake, Utah, has been in the city for several days.

THE number of miners who have gone into Alaska's interior this winter is smaller than in former years. No more than 150 men have gone up the Yukon.

THE Washington Aluminum M'fg. Co., Ellensburg, Wash., has issued a neat prospectus, which gives information most generally desired in regard to the enterprise.

THE Idlewild mine, El Dorado county, has decided to light its surface and underground works by electricity and to that end has purchased a 150-light outfit. The power will be supplied by a Pelton wheel.

RECEIVER SCHLEY has sold the Morning mine, located in Shoshone county, Idaho, to Charles F. Pfister, at Milwaukee, Wis., for \$175,000, subject to a mortgage and bills which will bring the amount up to \$251,000.

THE Cable Gold Mining Company has incorporated with a capital of \$1,000,000, of which \$2500 only has been subscribed. Directors—David N. Hawley, John L. Boone, P. E. McCarthy, F. N. Clark and J. L. Fields.

THE Sunset Mining and Milling Company has filed articles of incorporation in San Francisco. Directors, Ernest J. Isham, Sydney Hart, Herbert Rosenthal, Walter G. Anderson, J. C. Eubanks and James P. Sweeney. Capital stock, \$500,000.

BETWEEN Hontington and the mouth of the Powder river, Or., a distance of about 25 miles, not less than 50 miners are engaged with rocker and sluice fine-gold mining on the bars of Snake river. From \$1 to \$2.50 a day is counted as good pay.

THE first shipment of silver bullion from the new Valardea smelters at Valardea, Durango, Mexico, is en route to the refining works at Omaha, Neb. The shipment consisted of 12 carloads. The smelters at Valardea yield a carload of bullion daily.

A RUMOR has been going the rounds of Forbestown that Alvinza Hayward, several time millionaire miner, has negotiated the purchase of the Burlington mine, probably better known as the Williams' mine, situated just outside of the Forbestown limits.

THE second payment on the Hayes mines at Junction City, Trinity county, by the French syndicate that purchased the mine last fall, was made Jan. 15th, and the company has taken possession. Work will at once be begun in fitting up and preparing for the spring run.

THE following appointments have been announced at the Mint: Ewing Bowers, San Francisco, workman; P. F. Fitzgerald, Oakland, workman; Cecil Drake, Humboldt, watchman; Miss Daisy Smith, Siskiyou, adjuster; Miss Ada Rickard, San Francisco, adjuster; Miss Flora Vivian, Colusa, adjuster.

A MINER named Martin Riley had a narrow escape from death at Butte, Mont., a few days ago. He was ascending a ladder in the shaft and had reached the 450-foot level, 200 feet from the bottom, when the ladder gave way. He fell 50 feet and struck on a piece of timber and was saved from death, though seriously hurt.

MONROE THOMPSON, owner of the mine on the Swasey place, who has been experimenting on an electrical process for working ore, says the Redding Free Press, has succeeded in making the process do the work required, and will immediately erect a plant on his mine. The ore is base, but very rich. If the plant is a success, it will open up a new era in working the base ores of the country.

A DISPATCH from Port Townsend, Wash., says a chlorination vat at the Alaska Treadwell mine, Douglass island, was robbed last week of \$10,000 in gold. The robbery was committed at night and is enveloped in much mystery. As customary, water was turned on in the vat, so that the gold might separate from the quicksilver and refuse. The following morning the water was drawn off and the vat was empty.

THE T. M. & M. Co. still ship their average amount of 300 tons of ore per month, notwithstanding the low price of silver, says the Tombstone Prospector. The cyanide process experimental station with a dynamo attachment has not yet developed into successful venture claimed for it by the exponents of its merits. The properties of the company are looking well. It is not the fault of the mines, but the price of silver which is the trouble.

THE Ludwig mill was started last week as an experiment, and it was thought it would not prove successful, says the Mariposa Gazette. It was built to run by water, and an immense wheel was constructed, but upon trial it was found that the volume of water was not sufficient to run the stamps. It is therefore deemed advisable to pull down the mill and rebuild it into a steam mill. Mr. P. McElligott, one of the best mechanics in the country, is to have charge of the new work.

THE Golden Star Mining Company, recently organized, proposes to develop the Anti-Chinese mine, Tuolumne county, which was formerly known as the White Quartz mine. This mine is situated in Tuttle town district, about a quarter of a mile southwest from Tuttle town, and about 1½ miles north of the Rawhide mine, on the mother lode. In former years this mine has produced some very good rock, which was taken from surface cuts and holes promiscuously without any regard to system or practical manner of mining, as now recognized. The company under the practical management of Geo. A. Richards

proposes entering a tunnel in on the mine for a distance of 400 feet, which will open the vein at a depth of 298 feet below the surface. At this point there is at the present time exposed by surface cuts, a body of ore which in extent and value will make this property one of the many gold producers of Tuolumne.

THE old Jordan & Galena Mining Company have been forced to close their mines and mill at Bingham, Utah, because of the situation the mining industry has been placed in through legislation by Congress. In 1893 this company produced in round numbers 6000 tons of lead, 250,000 ounces of silver and 2500 ounces of gold, which sold for about \$675,000. The same production in 1892 would have given returns in sales, under the prices ruling that year, of about \$100,000 more than the company received for its ore in 1893.

JOHN P. LEONARD of Butte county, writes to a local paper as follows: 'I desire in the interest of correct history to say, that in the fall of 1857, I then being bookkeeper in the office, and H. B. Lathrop being president of the Cape Mining Claim that on a certain Sunday (date not now remembered) while the work of mining said claim was going on, went up there to see it, and while there a very rich spot being uncovered, we took up out of the natural deposit of gravel a pan full of dirt, had it

Low-Grade Ore in Colorado.

Senator John P. Jones, the silver champion, has, in common with many others who have made fortunes in silver mines, turned his attention to gold properties. He has secured a low-grade ore proposition in Colorado and proposes to develop it on an extensive scale. The Senator himself is responsible for the following statement:

"It was while in Denver," he said, "that I first heard of this new district. A man named Baker came to me there and told me about it. The gold fields are about seven miles north of Durango, in the La Plata mountains, at an altitude of 10,000 feet, and there is ten feet of snow there now. Because of this we cannot tell exactly what the country is like. The snow is too deep to do anything. However, when I heard of the quantity of low-grade quartz there I wired my brother Sam, and he went down, and while there hooded a number of claims. The story of the

ledge as told me by Baker seemed almost too big to believe. You know how anything in reference to a mine is apt to be exaggerated. Yet I have no reason to doubt the story. He reported to me that the ledge was from 200 to 300 feet thick, flat, and cut clear through the mountain. The ore was low grade, which was just what we wanted. A few years ago nobody would touch any ore unless it was rich, and the Colorado people are not yet accustomed to working low-grade ore. But here in California we got over that long ago. We found that the most valuable kind of a mine was one with ore of low grade, and the lower the better, for as we experimented we found that the lower the ore the bigger the quantity and the more apt it was to be continuous and permanent.

"This has been shown in a striking degree with that Alaska property, the Douglass Island mine, which is probably the biggest thing in the country. It has also been shown in other sections of the country, so that it has become almost an accepted fact, especially on the Pacific coast, that the lower the ore the more of it, and the more value by far of the mine.

"Well, when this man saw me and showed me his specimens and I heard his account, it at first seemed strange. But he said to me

that he was looking for capital, he wanted the right man, and, added he: 'It doesn't cost you a cent; you can go down and examine the ledge, and if it isn't all I say it is you are not out anything and you will know for yourself what it is.' He was very square and didn't want any money in any way.

"The outcome of it all was that an inspection of the great ledge was made. We found it, as near as we could judge, as he had represented it to be. It was of hard quartz and having gold apparently all through. The ledge was very solid and nearly flat, cutting through the mountain. We located about a half a mile of the face of it. The ledge was in size what had been stated, or say from 200 to 250 feet thick. Possibly in some places it might go down 100 feet, and then again to 200 feet.

"From appearances the ledge extends to the other side of the mountain, for it was learned from mining men that pieces of quartz had been found there, which indicated that they had been broken off the ledge. Besides this, gold has been found all along the La Plata river, and, from what can be learned, it must have come from this. The pieces of quartz float, when tested, were found to run \$6 a ton in gold, and none of the ledge went less than this.

"Should the ledge prove, when the snow goes off, to be what is represented, bigger mills will be required than have ever been put up before, and they can run for an endless period, for the supply of quartz is enormous."



LIEUT. A. M. HUNT, CHIEF OF THE MECHANICAL ARTS BUILDING.

washed out in a rocker, then cleaned at the office on the bank, and the gold thus obtained in that one pan of dirt weighed 104 ounces and 4 pennyweight, worth something over \$2000, and there was not a piece of gold in the lot that would weigh as much as ten cents, it being all fine scale gold."

THE company which proposes to furnish light for the towns of Amador City, Jackson and Sutter Creek—in Amador county—all within a radius of a few miles, has perfected its plans and ordered a part of its outfit. The central station is at Sutter Creek and a 125-horse power will be used. Only lights will be furnished at first in the several towns and the stamp mills in the vicinity, but it is a part of the plan also to supply power to the towns and mines. The contemplated electric road from Ione to Jackson will also secure its power from Sutter Creek.

It seems as if the cyanide process was about to establish itself upon a firm footing in South Australia, says the Mining Standard. It has already been applied with considerable success to the treatment of ores at Wadnamanga and has given a distinct impetus to the mining operations in that district, and now it is suggested that a plant should be established in a central position in the auriferous country among the Mount Lofty ranges, near Adelaide. There is abundance of material in the Adelaide hills to operate upon, and with the exercise of a little energy and good management, there ought to be money in the treatment by cyanide of vast quantities of ore which have resisted efforts made in the past to extract the gold from them with profit. The cyanide process has proved a great boon to South Africa; and, although we recognize that there is a wide difference in the circumstances there and here, we know of no reason why the process should not be extensively availed of in many mining districts throughout the colony where rich refractory stone exists in quantity, and has had to be left alone or has only been dealt with spasmodically.

Hydraulic Mining.*

A REVIEW OF THE INDUSTRY BY DR. HENRY DEGROOT.

In Eight Parts—Part VI.

The Discharge Pipe or Nozzle.—To that part of the hydraulic apparatus connected with the final discharge of the water through nozzles, various names have been applied, such as the "goose neck," "globe monitor," "dictator," "deflector," "knuckle joint," "little giant," etc.

While certain of these names are suggestive of some property, feature or other peculiarity of the machine, more of them would seem to have no special significance, although for each of these devices the inventor has claimed some peculiar merit, and not always without reason, only a few of the entire number are now much in use.

For the information of those not posted in these matters it should be explained that, in miners' parlance, the terms monitor, nozzle and giant mean all the same thing, they being applied to these several machines indifferently, and in the case of the nozzle, very improperly, as this is only an appendage of the apparatus, being only the projecting tube or nose through which the water makes its final escape. There is need for a specific name for these discharge pipes, which should designate and be confined to that portion of them by which these movements are directed and controlled, and thus the present confusion be avoided.

These pipes range from four to nine inches inside diameter, the quantity of water they are capable of discharging varying from 300 to 1500 miners' inches of water,

ground being heavy, two or more of these cross drifts are to be driven. Each arm of the main or terminal cross drift should be from 40 to 50 feet long; of the others, about 30 feet. When the bank has an extended face and only moderate depth, several parallel drifts may be run, or as many as conditions seem to require, their length being proportioned to the depth of the bank. In all cases the length of both the main and lateral drifts must be in proportion to the extent and nature of the ground to be shattered, both of which, therefore, should be carefully studied in advance. The main drift should be as small as can be conveniently driven, say three feet wide by four feet high, the cross drifts being a little larger. Sometimes instead of carrying in the main drift from the face of the bank, it is extended from the bottom of a shaft sunk for the purpose. Occasionally short drifts called "lifters" are driven at right angles to the cross drifts, from the ends and centers thereof, these "lifters" being carried back toward the face of the bank.

For blowing up shallow banks or patches of bottom gravel, shafts with a cross drift at the bottom, or having the lower part enlarged, giving the shaft a bottle shape, are employed. These are tamped and fired in the same manner as the horizontal drifts. The shaft, when the bank is not extremely high, answers about as well as the drift, and possesses the advantage of being much more easily tamped than the latter as the material used for this purpose, being that excavated in sinking the shaft, has to be simply shoveled in.

The quantity of powder usually employed on these occasions varies from 100 to 200 kegs to as many thousand,

a space between it and the roof of the drift. Sometimes a barrier of timbers is placed across the main drift at the intersection of the first cross drift prior to the former being filled in.

For several years, at first, common blasting powder was used in blowing up these gravel banks. Gradually, however, this has come to be almost wholly superseded by the use of a low-grade giant powder. For blasting boulders, trunks and stumps of trees, lava, pipe-clay, hard bottom, cement, etc., nitro-glycerin explosives are employed.

For firing the charge, both the common and electric fuse are in use. When the latter, one should be inserted for every 40 or 50 kegs of powder, as this insures simultaneous ignition and complete combustion of the powder, whereby its entire force is usually developed. The firing is usually accomplished by means of a high-tension electrical machine placed at a safe distance from the mine and connected with the insulated wires.

The Derrick.—For handling the larger boulders, a derrick, operated usually by a hurdy-gurdy wheel, is employed. When, as occasionally happens, a boulder is encountered too large to be raised by the derrick, it is broken up with nitro-glycerin or giant powder into fragments so small that the derrick can lift them and swing them around out of the way, some of these machines having a lifting capacity of ten tons or more. The larger class of these structures have a mast 100 feet high and a boom 92 feet long. The mast is supported by guys of one-inch wire rope; a whip-block with $\frac{3}{4}$ -inch steel rope being used for hoisting tackle.

The guys, six in number, are held by double capstans. Where the derrick is to be moved but a short distance, as a hundred feet or two, this is usually accomplished with wooden rollers and without being taken down.

The Rule Drift.

Dan de Quille, a well-informed writer on Comstock mines and mining, has just published a long article on the old bonanza find in the Con. Cal.-Virginia mine, in the *Salt Lake Tribune*. He closes with the following remarks about the Rule drift, which will interest many:

The ground on which Mr. Rule proposes to search for a missing bonanza lies between the great ore body found in the Con. Virginia and the first bonanza in the Ophir, that in which the first discovery of silver was made by Peter O'Riley and Pat McLaughlin, in 1859. When this bonanza was first opened it was the wonder of the world. It was immensely rich, both in silver and gold, at the very surface. At a depth of 180 feet, at what was called the third gallery, it showed a width of 45 feet of ore, and at the fourth gallery there was a solid body of ore 66 feet in width. At the time, so great a width of ore was unprecedented.

The ore of this bonanza was exceedingly rich. No ore was shipped to San Francisco that assayed less than \$1000 a ton, and the "low-grade" ore reserved for milling in the reduction works of the company, in Washoe valley, averaged \$200 to \$300 a ton. The bonanza, wastefully as it was worked, yielded over \$20,000,000. But, as already stated, it pinched out at a depth of about 500 feet.

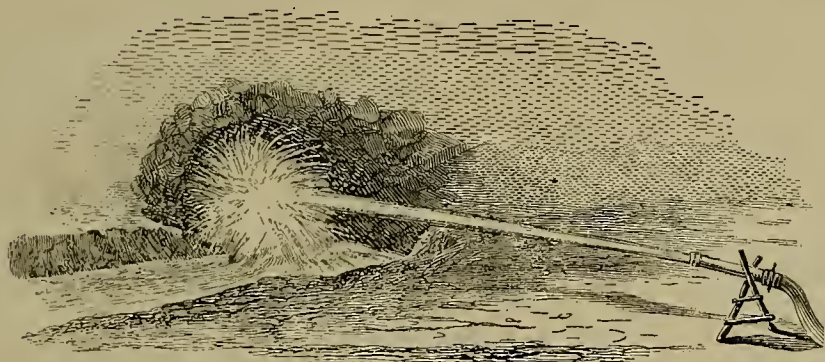
Undoubtedly the formation of this surface bonanza was the result of the operation of the same natural forces through whose activity was formed at a point 1800 feet below in the vein of the great Con. Virginia bonanza. Now, as the mineralized vapors and metallic emanations from the heated metals in the fiery depths near the lower part of the earth's crust must have ascended through this blank space of 1800 feet in the vein, the mystery is how it happened that no ore was deposited in any part of it.

To the southward on the Comstock lode, in the Gould & Curry, Hale & Norcross and other mines, no such extensive barren space was anywhere found between the first or upper bonanza and the next one below on the dip of the vein. There is one great cause of the existing suspicion that a bonanza has been missed in the blank space between the Ophir bonanza and that in the Con. Virginia.

Another reason for suspecting the existence of an undiscovered bonanza in this piece of ground is that it lies between two fertile sections of the lode in the line of the usual trend of Comstock ore chimneys, which is a little to the southward in descending; therefore it would seem that there can be nothing unfavorable as regards the mere rock formation. Besides, where Mr. Rule proposes to set to work is in the vicinity of the place where the first feeders of the big bonanza were found.

Many instances that might be given in mining experience go to show that a drift or crosscut may almost touch an ore body without finding it. Had not the Ophir bonanza first been discovered on the surface, a tunnel run into the mountain such a way as to have cut the vein at a depth of 500 feet would have found it pinched out, and it would have been pronounced worthless, whereas just above lay \$20,000,000.

Whether or not Mr. Rule deceived himself when he sup-



Giant Playing on Caved Bank.

according to size, pressure, etc. They can throw an effective stream on a gravel bank 200 feet away. Frequently as many as four, and even five, of the largest sized machines are played in a single pit at the same time, each machine discharging from 1500 to 1700 cubic feet of water per minute. Notwithstanding the force of one of these large jets of water, so indurated or so tenacious are some portions of the gravel to be washed that it has to be shattered with powder preparatory to playing the water upon it. The force of a large stream of water as it issues from one of these nozzles is hardly less than that of a cannon ball at the instant of its discharge. When operated the machine is brought as near the bank as is compatible with the safety of the pipe man, in order that the full effect of the jet may be obtained. When the bank is very high fatal accidents sometimes occur through its sudden caving. When much over a hundred feet in height the bank is piped off in benches as a safeguard against accident caused by these caves. The manner of piping off a cave is shown in the figure.

When it is said that a full set of the largest of these machines, as we sometimes see them operating in the hydraulic mines, is capable of performing the work of a thousand men, the remark is to be understood in a literal sense.

Bank Blasting.—When the material to be piped off is so hard or so tenacious that it cannot be readily broken down and disintegrated by the stream of water thrown upon it, recourse is had to powder for accomplishing that end. So, too, when the gravel bank is dangerously high, it is to be blown up with powder. The preliminary work required for this purpose consists in running suitable drifts under the bank to be blown up, charging the same with powder and laying the fuse, after which the main drift is to be thoroughly tamped. This drift is run in on the bottom from the face of the bank, a distance proportioned to the height of the latter and the nature of the deposit to be blown up, the quantity of powder used being determined

by the same conditions. As a rule, the length of the main drift should be about three-fourths the height of the bank, if this be considerable. From the inner extremity of this drift a cross drift is driven each way, forming a "T"; or, if the quantity of powder to be used is very large, the each keg containing 25 pounds. The minimum quantity required varies from 16 to 20 pounds for every thousand cubic feet of ground covered by the drifts; small blasts, other things being equal, require more powder in proportion to the ground than large ones. Thus, if 500 kegs of powder will break up from 40,000 to 50,000 cubic feet of gravel, 1000 kegs may be expected to reduce 120,000 cubic feet to a like condition. It is calculated that a successful blast will prepare double the area of ground covered by the drifts. As nearly as can be estimated there should always be enough powder to thoroughly shatter the bank, an excess being better than a deficiency. Two-thirds of the powder used be placed in the terminal cross drift, balance in the other cross drift. Where the drifts are dry the powder may be emptied in long boxes, or be left in the kegs, their heads having been removed. If there is water in the drifts or shafts the powder must be put in water-tight boxes, the lids being pierced with holes to admit the fuse, which, having been introduced, the lids must be fastened on firmly and the holes closed with wax, putty or other substance impervious to water.

After the boxes or kegs of powder have been placed in rows and covered with paper, the electrical wires are extended along them. The exploders are inserted in giant-powder cartridges and extended along on top of the paper covering the powder. The wires laid in the lateral drifts are then connected with those extending along the main drift to the electrical battery. If fuse is to be used for exploding the charge, it is here properly put in place—for the sake of greater security two or three lines being laid. In the center a layer of heavy rock is placed, forming the basis for the filling in or tamping, the material removed in excavating the drift being employed for this purpose. It should not be too damp, and, if present, all very large stones should be thrown out, as they may cause serious damage and perhaps injury to persons should a "blow-out" occur. Sand and fine gravel make the best tamping material. The tamping, jammed in with wooden rams, should be thoroughly done so that it will not settle, leaving

*This article was prepared by the late Dr. De Groot for the Eleventh Report of the State Mineralogist, just issued; but its publication with that of much other valuable matter was prevented by the necessity of revision and omission, so that the volume might be reduced to reasonable limits. It covers familiar ground, but is, on the whole, a complete and careful review of the industry and hydraulic-mining methods. The article has been furnished this paper by State Mineralogist J. J. Crawford.

posed he had cut into a before unknown body of ore, most mining men will agree that it is well worth while to give this particular piece of ground the benefit of more thorough exploration than it has yet received. There are in it brilliant possibilities.

The Era of Nickel Steel.

Extracts from Paper Read before the Colorado Scientific Society, Dec. 4, 1893, by W. L. Austin, Ph. D.

Attention had long been directed to the unusual properties displayed by meteoric iron, both in regard to its extraordinary toughness as well as in some instances to its non-corrodibility. Again and again during the present century investigators appear to have returned to this subject in examining the physical qualities of these celestial visitors and by endeavoring to produce artificially similar alloys. Meteoric iron is never pure, but is invariably associated with nickel and other elements, and the desirable qualities attributed to it are ascribed to this fact. It became clear at an early date that iron alloyed with nickel differed materially from the pure metal, but certain obstacles were encountered in bringing these metals together, and even when this was effected the results were far from corroborating each other. Faraday experimented in this direction by melting horseshoe nails and pure nickel together in various proportions, reaching finally only contradictory results. Berthier also made some alloys of the two metals, producing a mixture corresponding to that of a meteoric iron found near Bogota. In 1861, Loogmaid patented (British patent No. 1863, A. D. 1861) some alloys of iron and nickel, but used only very small amounts of the latter metal. Liebig examined the same subject in 1832. Mr. Fairbairn, in 1858, recorded the results of some experiments on alloys similar in composition to meteoric iron, and Boussingault, as well, investigated the subject in connection with researches on metallic meteorites, which, in fact, seem to have been the incentive that urged on all early investigators of these alloys.

But all efforts to manufacture a commercially valuable alloy of iron and nickel were in vain until a few years ago, the trouble being that the tremendous influence of minute quantities of other accompanying metals and metalloids was not understood nor suspected. It is strange that the effect of impurities on the alloy should have been unappreciated for so long a time.

Kunzel, in his report on the Vienna Exposition, speaking of the experiments made in 1860 at the Liege cannon foundry, in which it was aimed to improve the quality of ordnance metal by the addition of a little nickel, says the result was negative, and declares he cannot understand what qualities of the iron (roheisen) or nickel warranted the undertaking. Even Ledebur himself has predicted that the new nickel-steel alloys belong to that class of inventions which crop up at intervals, finally to be buried in oblivion because of their impracticability.

Probably the first appearance of nickel-iron alloys in the United States was when Philip Thurber of Detroit, at the New York Exposition in 1853, exhibited some products of the iron furnace at Marquette, Michigan. This iron was made from a nickeliferous limonite and possessed some remarkable qualities, but it was not until 1888, after experiments had been made first in France with crucible nickel-steel alloys, and subsequently in England with similar mixtures produced in the open hearth, that the subject was brought in general notice.

In May, 1889, Mr. James Riley, at the request of the Iron and Steel Institute of Great Britain, read a paper at their meeting in Glasgow, in which he set forth the results of the experiments he had been making with nickel-steel. Riley had been over in France, at the invitation of Marbeau, for the purpose of looking into the claims made for certain crucible nickel-steels by that engineer, and having satisfied himself as to their genuineness he returned to his works in Scotland and began experimenting with similar material, using an open-hearth furnace in the place of the crucibles employed in France. The results obtained by Riley are given very fully in the proceedings of the Iron and Steel Institute. Notable among them was one nickel-steel alloy containing 4.7 per cent nickel, which showed an elastic limit of 28 T. per square inch and a breaking strain of 40 T. per square inch, whereas similar steel, without the nickel, showed only 16 T. and 30 T. respectively. The elongation and contraction of area of this steel were, moreover, not materially impaired.

In August, 1890, the papers stated that the United States Naval Board was about to test "a newly-invented nickel-steel plate" recently purchased by the Chief of the Bureau of Ordnance from the Creusot works. On September 18th and 22d this plate was tested at Annapolis, Maryland, together with other representative armor plates submitted for trial, to ascertain which style of protective armor was the best for use on the new United States men-of-war then building. At these competitive armor trials the victory

rested with the French nickel-plate steel, as against another carbon-steel French plate, and a compound one of English make. On September 26, 1890, a bill was introduced and immediately passed by the House of Representatives appropriating \$1,000,000 to enable the Secretary of the Navy to purchase nickel ore and nickel mattes for armor manufacture. It appeared to outsiders as though the authorities were acting with undue haste in the matter, and immediately stories began to circulate detrimental to the new material, suggesting the possibility of a "job" lying at the bottom of the hasty action on the part of Congress. It was stated that the new steel became exceedingly brittle when subjected to great cold; that its magnetic properties were such that ship's compasses, under certain conditions, could become totally deranged; in fact, that the new product was very unreliable and uncertain in its behavior. It appeared as though experience with alloys of iron and nickel on the part of experts had been for too long a period of a doubtful nature to admit of an opposite opinion being hurriedly reached.

Mr. Tracy, however, who was at that time Secretary of the Navy, decided to have very careful tests made of this armor before adopting any kind in the new navy, and proposed to employ for such test plates that were to be made of American material by American mills. As a result of this decision, orders were given to the Bethlehem Iron Company and to Carnegie of Pittsburg to prepare such plates, the Government furnishing the necessary nickel for the work.

Shortly afterward Mr. W. L. Abbott, of Carnegie, Phipps & Co., in reporting to Mr. Tracy the progress in the manufacture of nickel-steel plates at the Homestead works, near Pittsburg, showed samples taken from some of the material out of which the trial plates were being manufactured, and which had been rolled down to three-fourths inch for experimental tests. These gave an ultimate tensile strength of 100,000 to 102,000 pounds per square inch, with an elastic limit of 59,000 to 60,000 pounds. The elongation was 15½ per cent, with reduction of area of 29½ and 26½ per cent respectively at fracture.

The toughness of nickel-steel is very great. During a visit which the writer made to the Bethlehem works last spring, a large field was observed which was covered with blocks of nickel-steel that had been cut off during the process of manufacturing the armor plates. Many of these ingots weighed several tons. They had been set out in the open field adjoining the works because it was said that no profitable method of breaking them up into sizes suitable for returning to the furnaces had yet been devised. Attempts had been made to blast them with dynamite, but the explosive shot out of the holes as from a cannon, doing little execution on the blocks. Another illustration of the toughness of the metal is given in the late experiments by the German Government, where shells were exploded in cannon, the one of ordinary gun steel, the other of nickel-steel. The former was badly damaged, whereas the latter was only enlarged.

One by one the objections raised against nickel-steel have been removed. The effect of cold weather on the plates was experimentally demonstrated to be of no importance, and in April, 1891, the first nickel-steel plates of American manufacture began to arrive at the Washington Navy Yard for testing purposes. Plates of all descriptions, with and without nickel, were exhaustively experimented with. High and low carbon steels were shot at; plates just as they were rolled or forged, and others which had been surfaced hardened (Harveyized) were again and again subjected to the fire of the most formidable modern ordnance made, rifles as high as 12-inch caliber being used. These tests extended all through the summer, fall and winter of 1891 and 1892, and are still in progress, a plate being taken for testing purposes from each lot of material delivered by the works. The results have demonstrated beyond all doubts the superiority of nickel-steel for armor purposes. The tough, tenacious material flows under the impact of the shot, and in the case of the "Harveyized" plates, the extreme hardness of the exterior surface, reinforced by the tough, untreated steel behind, shatters the forged steel Holtzer projectiles, which have hitherto proved irresistible.

Corrosion of Pumps in Copper Mines.

The Montana Society of Civil Engineers held its annual meeting in Helena last week. Mr. C. W. Goodale, superintendent of the Gagnon mine in Butte, addressed the society in regard to the matter of the corrosion of iron pumps and columns caused by the presence of sulphuric acid in the water pumped from the Butte mines. He stated that in the Gagnon mine there is considerable water constantly leeching down through the old stopes, and in so doing it seems to become impregnated more or less with sulphuric acid, which acts on the columns and pumps.

"There is quite a difference in the character of the water

in the different parts of the mine. The silver mines do not have water that is particularly troublesome, but in the copper mines there is a great deal of trouble. In the Gagnon mine we have very troublesome and corrosive water. Four years ago it was not causing any particular trouble. We often used it for boiler feed, but found that its action on the mud drums made it necessary for us to discontinue using it for that purpose. It was still giving us no trouble in the pumps and columns; but as time went on and the mine was opened up there was more of this low-grade ore for the water to leech through, until the present year has brought us face to face with the necessity of using something besides iron for the columns.

"Two and a half years ago we put in a seven-inch column to throw this water to the surface, and for awhile it showed no particular corrosive action; but during the last spring a corrosive action on the iron was very apparent, and the surprising thing about it is that this action shows first at the top of the column. As it went on more leaks occurred, until one length of pipe consisting of 15 feet had 13 clamps. I was fully determined that we must use something besides iron, but just what ought to be used is a serious question. There is one copper column in the mines in Butte, but copper is so expensive that it is almost out of the question for us to think of duplicating that column. There is also a brass column five inches in diameter, but I understood there is some objection to that. I think it is probable that we will have to come down to using iron pipe lined with wood, which is the cheapest method I know of keeping the water away from the iron."

Forestry in the United States.

The report of the Executive Committee of the American Forestry Association shows that the work of the association is beginning to bear fruit, as may be seen from the following abstract of reports recently issued by the association:

Not only has the policy of reserving public timber lands for forestry purposes, established by the last Administration, been recognized by the present Administration, in reserving some 4,500,000 acres more (the Cascade Range and Ashland Timber Reserves in Oregon), making the total acreage in forest reservations nearly 18,000,000, but there is ground for hope that some rational legislation for protecting and utilizing these reserves may be enacted. Members of the association and all friends of forestry are requested to urge upon their representatives the passage of House bill No. 119 as a first step toward a more rational use of the public timber lands.

While the action of the President and the assurances of the passage of such legislation are encouraging as committing the Government to a sound forestry policy, we have grounds for encouragement in other directions. The devotion to forestry of a special building and the creation of a special department of forestry at the Columbian Exposition are signs that our subject is permanently established, and the action of the Exposition authorities has done much to widen the circle of those who appreciate our endeavors. The special meeting of the association at Chicago, under the auspices of the World's Auxiliary Congress, has been hopeful in the same manner, and was successful especially in impressing the representatives of the lumber trade with the legitimate aims of the association and the need of its work for the benefit of the lumber interests.

The president of the association is at the head of the U. S. Department of Agriculture; one of our former secretaries is in charge of the public timber lands at the General Land Office; and the Chairman of the Public Lands Committee in the House of Representatives is fully persuaded of the necessity of new legislation along the lines urged by the association; and there is a realization that virgin forest resources have shrunk so as to expose as childish the cry of "inexhaustible" supplies, and the knowledge is at last dawning on the irrigators of the West that "the forest waters the farm," while there is a general awakening of public interest in the forestry movement, which purposes to turn the irrational destruction of a great national resource into a rational husbandry of the same.

The provisions of the bill mentioned above are extremely simple. Protection of the forest reservations (now comprising nearly 18,000,000 acres) is sought by the employment of the army, which has done such effective work in both the Yellowstone Park and Yosemite reservations. The Secretary of the Interior is empowered to make such rules and regulations and establish such service as will insure the objects of such reservations, namely, to regulate their occupancy, to utilize the timber of commercial value and to preserve the forest cover from destruction. He is also empowered to have cut and to sell timber on non-reserved lands under the same regulations as made for the forest reservations, provided that it shall be first shown

that such cutting will not be injurious to the forest. The plan is endorsed by officers of the American Forestry Association, and is hereby recommended for support and propaganda by all friends of the association.

The Slocan, B. C., Mining District.

Wm. Meadows in *Spokane Mining Review*.

I will offer a few observations in a general way in regard to this country and what we are doing in the way of mining. Every one says—miners, prospectors, practical mining men, experts and men who never saw a mine—that, "so far as surface indications go, it beats anything they ever saw in this or any other country." I will join the crowd, and state a few facts from which my conclusions are drawn.

The formation (geologically) I consider most favorable to metalliferous deposits, especially of this kind (galena) belonging to the older stratified rocks, and made up of argillaceous schists, slates and limestone of a more or less crystalline and shaley character, of a dark color and on the whole rather a soft formation, penetrated by eruptive dikes and intrusions. The general trend of the strike is north-west and southeast, and all dip to the southwest at various degrees to nearly vertical. The mineral veins occur in all manner of forms, from bed with strike and dip of strata to a cut at right angles. This mineral belt in a general way is surrounded on all sides by metamorphic and igneous rocks; on the south and west by granite; on the east by schists; on the north by different eruptive rocks.

This belt, so far as I know of valuable deposits being discovered in this immediate vicinity, may be embraced in a diamond or oval about 20 miles in long diameter, extending from the mouth of Four-mile creek (which empties into Slocan lake) northeast to McDonald's group at the head of Lile creek (a north tributary of Kaslo river), and about 12 miles wide, extending from the head of Twelve-mile or Big creek (a south tributary of Kaslo river) northwest to North Carpenter creek, on Slocan lake side of the divide.

These lines are drawn diametrically across the country. Our ores are high grade, being chiefly clean argentiferous galena, carrying from 100 to 500 ounces silver and 50 to 85 per cent lead. Picked specimens assay several thousand ounces of silver, but they are not to be seriously considered. As a fact, ores carrying less than 100 ounces can scarcely be handled at a profit at the present cost of transportation, as it costs upward of \$25 per ton to get the ore from the mines to Kaslo, the present shipping point, and then the boat and railroad transportation according to destination of ore. The greater part of this cost will be saved on the completion of the railroads now under construction. The Nakusp & Slocan Railroad connected with the C. P. R. have their grading work about completed to Three Forks (a central locality in this district), and the road will doubtless be pushed to completion as soon as navigation opens in the spring to enable them to get in necessary material. The Kaslo-Slocan R. R. Co. are clearing right of way on their road, and intend to put in their trestles and bridges this winter to avoid the hindrance of high water next spring, and expect to have their road in operation by the middle or latter part of next summer. There are now being shipped from the mines 20 to 25 tons of ore daily that will average upward of 150 ounces silver and from 50 per cent up of lead. When we remember that there was not even a pack-trail into this country until but little over a year ago, nor a prospect hole ten feet deep up to that time; and when we see that there is not yet a mill, concentrator or piece of mining machinery of any kind in the country, we are inclined to drift into speculating on the future. We severely felt the financial depression—in fact, were nearly swamped, country and all, for a time, as a great many had taken bonds on properties and made considerable cash payments who found themselves unable to lift bond or test the value of the property, and a great many of these claims still remain in the hands of prospectors. In fact, but comparatively few mines have as yet actually changed hands; but we do not expect this state of affairs to last. Capital cannot afford to overlook or neglect this country, nor will it do so. And even now, although the country is under from three to four feet of snow, we hear of new deals being made, new mines starting work and frequently hear inquiries for mining property. I have spoken of the ores as being a clean high-grade galena (carrying an unusual amount of silver and free from gangue); and so they are, so far as have been handled and generally speaking, but there are lower grade properties that will require concentration, and some of the mines—the most productive so far—have large quantities of lower or second grade ores that will not pay to handle as they are, but would turn out a good grade of concentrates at about three into one. As a further exception, I may mention that in the northeast part of the above defined territory, embracing the country between Fish and Bear lakes and North Carpenter creek, there is a promising dry ore belt from which fine samples of gray copper and

silver sulphide ores have been taken. Again, in the northern part in what is called Whitewater basin, it has been reported that auriferous quartz has been found in places in which native gold was plainly visible, and from which high assays of gold was had, but of the certainty, extent or value of which I am not prepared to speak. But few of the mines, if any, are scarce past the stage of prospecting development. I feel safe in saying there is not a shaft 200 feet deep in the camp, and but few of the mines employ over six or eight men at actual mining, as they are not yet in shape to furnish working room for a larger force.

Among the mines that have shipped more or less ore are the Washington, Mountain Chief, Noble 5, Freddie Lee, Bluebird, Dardanelles, Idaho, Cumberland, Northern Bell, Wellington, Slocan Star, Lucky Jim, Paine, Miner Boy, Big Bertha, Lucky Boy, Rico, Whitewater and others, the names of which I do not remember, and many of the most promising properties are not included in the shipping list. Some are waiting for the railroad and others are held by prospectors and men unable to do the necessary preliminary work. I am sorry that I cannot give the exact production of each mine and the value thereof, but I have not that information at hand, but will say there has been upward of three thousand tons of ore shipped at a value of over \$500,000. Considering our embryotic state and the reverses we have met, we call this a fair showing; and when we realize that we are actually shipping ore at a good profit under present difficulties, including high tariff on lead, low price of silver and high rate of transportation, we feel that we are destined to live and prosper. Taking everything into consideration, we think it beats anything we ever saw. I would say to those contemplating a move to this country that muscle at present is somewhat in excess of demand, but capital will find a wide and promising field for operation.

Mining Dividends in 1893.

The San Francisco *Bulletin* of recent date contains a review of mining dividends for 1893 from which the following is taken:

The Alaska-Treadwell paid \$375,000 last year. This includes a bonus dividend of \$75,000 last July. Our record for the Idaho is \$105,400. The property was sold to the Maryland people last spring, and most of the dividends were from the proceeds of such sale and the surplus on hand at the time of such sale. The official report of the Kennedy mine is \$460,000 for the fiscal year ending December 1st. The Great Western is credited on our book with \$37,500 in three dividends. We have only seven dividends for the W. Y. O. D., making \$21,000; five for the Champion of \$50,000; five for the Morning Star of \$24,000; nine for the Mayflower Gravel (including an extra) of \$90,000; one for the Mt. Diablo of \$15,000, and three for the Standard Con. of \$30,000. The Coptis paid one of \$10,000 in October. We have a total of \$3,742,960 by 57 gold, silver, copper and quicksilver mines in this country in 1893. Apportioned among the States, these dividends may be distributed as follows:

	Mines.	Amount.
Alaska.....	1	\$375,000
Arizona.....	1	300,000
California.....	13	1,114,460
Colorado.....	13	2,402,000
Idaho.....	3	490,000
Michigan.....	2	2,120,000
Montana.....	7	873,000
Nevada.....	6	208,500
South Dakota.....	2	210,000
Utah.....	5	660,000
Totals.....	56	\$8,782,960
1892.....	84	11,702,800
1891.....	102	16,929,800
1890.....	73	13,485,400
1889.....	75	12,210,400
1888.....	68	13,532,000
1887.....	66	10,480,700
1886.....	58	10,088,100
1885.....	53	8,290,600
1884.....	64	9,462,700
1883.....	50	10,150,200
1882.....	64	13,308,100
1881.....	60	13,563,400

The amount for 1893 is the smallest in many years. Of course the total does not cover all the dividends paid by all the gold, silver, copper and quicksilver mines in the country, but this has never been the case in the totals for previous years. So the comparison is just as accurate, so far as it goes, as if all mines were covered. It is known that there are several mines in this State that divide up something in the way of profits every year among their owners, of which the public is not advised. The famous Utica mine in Calaveras county is one of that order. The Kennedy mine in Amador county paid dividends in 1892, but did not report any, whereas it reported \$460,000 in 1893. Despite these irregularities, it is lamentably true that the mining dividends of 1893 were much smaller than for the previous year. The great falling off may be traced to Colorado, Michigan, Montana, Utah and South Dakota. The single Alaska mine paid \$75,000 more than in 1892. We have \$68,000 more from Arizona, but the total was credited to a single mine, whereas four mines were in the dividend list of Arizona in 1892, including \$140,000 from

the Copper Queen. We think there must have been dividends from other Arizona mines last year.

In 1892, fourteen California mines paid \$704,500. If the Kennedy had been included that year, as it ought to have been, the amount for the State would have been about the same as in 1893. Colorado reported \$3,176,800 from 25 mines in 1892. The great depression in the price of silver accounts for the lessened number of dividend mines in that State in 1893, and for the falling off of \$774,000 in the amount of dividends. The Mollie Gibson alone paid \$470,000 in 1892 than in 1893, but this was nearly offset by the Cleopatra, which was not in the list in 1892. The property was opened in April, 1891. The mine is near Pitkin. Last May it was predicted that there was ore in sight for two years. The Colorado mines paying dividends in 1892, but uncredited in that way in 1893, are the Adams, American Gold, American Nette, Anaconda, Argyle, Best Friend, Boston & Colorado, Bull Domingo, Clay County, Cook's Peak, Farncomb Hill, Hope, Lexington, New Gunston, Poorman, Limited, and Realto. These omitted mines paid \$550,685 in 1892. The new Colorado mines of 1893 are the Cleopatra, Pico-Aspen, Trinity Hydraulic, and Victor.

The dividends from Idaho are \$128,000 larger than in 1892. The DeLamar mine alone increased its dividends \$178,000. The Red Cloud paid \$60,000 less. But the Cœur d'Alene paid \$30,000, against \$20,000 for the Helene and Frisco in 1892.

The five copper mines of Michigan paid \$990,000 less than in 1892. Instead of the usual four dividends of \$500,000 each from the Calumet & Hecla, as in 1892, that mine paid only two of that character in 1893—one in May and one in September. The Franklin paid \$40,000 less and the Osceola \$50,000 less. The Murray paid \$100,000 more. There was no change in the amount paid by the Tamarack. The low price of copper and the general business depression last year made these copper dividends the smallest in several years. The total for 1891 was \$3,540,000.

Montana suffered more than Colorado from the silver depression, though her people made less fuss about it. The mining dividends of Montana fell off 50 per cent last year, the amount paid in 1892 being \$1,695,375 by twelve mines. Six of the mines that paid in 1893 also paid in 1892, together with the Hope, which did not pay in 1892. The six of 1892 omitted in 1893 are the Bannister, Granite Mountain, Helena & Victor, Jay Hawk, Moulton and Pandora. These six mines paid \$717,375, including \$500,000 by the Granite Mountain, which has been the leading disburser for some years. That mine paid \$1,400,000 in 1891. Up to the suspension of dividends in July, 1892, it had paid \$12,120,000. These dividends were suspended because the pay ore gave out. Before the payment of the above large amount in dividends, the mine was at one time on the point of being abandoned, and orders to that effect had been issued; but ore was found in time to prevent their execution.

Three of the mines of Nevada that paid dividends in 1892 also paid in 1893. These were the Coptis (or Young America South), Cortez and Dexter. Three that paid in 1892, but not in 1893, were the Eureka Con., Jackson and Nevada. Three that paid in 1893, but not in 1892, were the Con. New York, Mt. Diablo and Richmond Con.

We do not recall a mine in New Mexico that paid a dividend in 1893, and only one that paid \$20,000 in 1892.

Only two South Dakota mines paid in 1893—Golden Reward and Homestake. These also paid like amounts in 1892. There were also, in 1892, \$20,000 from the Buxton, \$110,000 from the Deadwood Terra and \$22,500 from the Monitor.

Utah suffered the most of all in the way of a loss in dividends through the suspension altogether by the Ontario mine, and partially by the Daly. The former was good for \$75,000 per month and the latter for \$37,500 per month. In 1892, eight Utah mines paid \$1,520,500, including \$750,000 by the Ontario and \$450,000 by the Daly. Four other small mines paid \$45,500 in 1892, but only one of these was represented in 1892 by \$5000. The Centennial increased its dividends from \$75,000 to \$187,500 and the Horn Silver from \$200,000 to \$230,000. The Mercur was a new mine with \$50,000. Dividends in a number of California and several other mines were:

Alaska-Treadwell.....	\$300,000
Champion.....	50,000
Cortez.....	45,000
De Lamar.....	450,000
Great Western Quicksilver.....	105,400
Idaho.....	460,000
Kennedy.....	460,000
Mayflower Gravel.....	90,000
Morning Star Drift.....	24,000
Mt. Diablo.....	15,000
Napa Con. Quicksilver.....	70,000
North Star.....	100,000
Omaha.....	27,500
Plumas Eureka.....	43,200
Quincy.....	300,000
Sierra Butte.....	30,825
Standard Con.....	30,000
Trinity River Hydraulic.....	120,000
Victor.....	120,000
W. Y. O. D.....	27,000

Interesting Mining Decision.

The following interesting decision has just been rendered in the Superior Court for Siskiyou county by Judge Beard, in the case of J. E. Randles, plaintiff, vs. James Coggins, defendant.

This action was brought to determine the right of possession to certain placer mining ground, situated on the south fork of Hungry creek, in the Cottonwood mining district, said county and State. The plaintiff claims to be entitled to the ground in controversy under a placer location. The defendant makes a like claim, and to the same ground as that embraced within the plaintiff's alleged location.

The facts in this case, material to the issues presented by the pleadings, are substantially as follows:

The ground has been claimed and worked, as a mining claim, prior to the time at which either of the parties to this action assert or make any claim to the same. For the purposes of this action, both parties concede that at the time at which they severally claim the same by right of location it was vacant mineral land belonging to the United States, and open to exploration, occupation and purchase under the laws of the United States governing the occupancy and disposal of the mineral lands.

The defendant went upon the ground in controversy on October 20, 1893, established his residence thereon and commenced mining operations. After working about ten days the defendant made inquiry to ascertain if the ground was vacant, and, in pursuing investigation in this direction, examined the records of mining claims in the office of the County Recorder. Upon becoming satisfied that the ground was subject to location, he returned to the premises in controversy on the third day of November, 1893, for the purpose of properly asserting his claim to the ground and locating the same, by making the boundaries thereof, etc. The plaintiff, in the meantime, and on said third day of November, and before defendant had perfected his location, blazed out the lines, established corners and put up a notice on the ground, claiming the same by location, and had said notice recorded in the office of the County Recorder of the said county.

At the time that plaintiff went upon the ground for the purpose of locating the same, he knew that the defendant then resided upon and was engaged in working a portion of the ground covered by his (plaintiff's) claim of location.

The evidence discloses the facts that the defendant originally went upon the ground for the purpose of appropriating it for mining purposes, and that he, in all things, acted in good faith in the premises. The plaintiff has done no work upon the premises, and has not, in fact, done anything other than to locate the ground.

This action was commenced on the eighth day of November, 1893, and an injunction order was then obtained, and immediately thereafter served upon the defendant, restraining him from performing other or further acts on the premises. The defendant did not mark upon the ground, or establish the lines of his claim, until about the eleventh day of November, 1893.

There is no evidence in this case that there is now in force in the said mining district any local law, custom, or usage, requiring that notice of a mining location be posted on the ground or recorded, or that the exterior boundaries of the land claimed shall be marked on the ground. There was testimony to the effect that mining notices were received by the County Recorder from all parts of the county for record, and that the same were recorded in books kept for that purpose.

This evidence does not, however, establish the existence of local regulations, requiring the posting or recording of a notice, or marking the boundaries. As between these parties the question, then, presented for determination is, which of the two is, in contemplation of law, the prior locator, and entitled to this ground under the mining laws of the United States.

A party who, without complying with the requirements of law or local regulations, goes upon mineral lands belonging to the United States and relies exclusively upon his possession or work, is not entitled to the possession of the same as against one who subsequently peaceably locates a mining claim covering the same ground, and in all things complies with the Federal laws and district regulations. *Horsewell vs. Ruiz*, 67 Cal. 111, and see cases there cited.

It is not necessary that a party intending to locate placer mineral land actually discover valuable mineral therein before making such location. The location is valid without such discovery: *Gregory vs. Pershbaker*, 73 Cal. 109.

The object of notice of location of a mining claim "is a temporary protection of the claimant while the other acts of location are being performed, including the marking of the boundaries of the location. Under the law of Congress, distinctly marking the location upon the ground so that the boundaries may be readily traced is necessary, and is the main act of original location. All

such acts as are designed to afford a temporary protection to the claimant in the location of a mining claim should receive a liberal construction." *Donahue vs. Melster*, 88 Cal. 121.

A recorded notice only gives information of such claims as are at the time actually located. And a location on the ground does not give information of a claim unless it appear that the party posting the notice is, with reasonable diligence, proceeding to mark the boundaries of the claim indicated in such notice: *Gregory vs. Pershbaker*, supra.

"As between two persons, neither of whom had done any work before the attempted location, the issue must be determined by reference to priority in the statutory designation, on the surface of the limits of the claim." But in determining the question of priority in the particular referred to, says the Court in the case last mentioned, "it may be possible that the person doing the work in the ground, and who has indicated by his acts his intention to perfect a location under the mining laws and statutes, should be held, by proper application of the doctrine of relation, to have marked the boundaries of his claim, in legal effect, as against one who, for the purpose of depriving him of the benefit of his work, or of his discovery of mineral of value, shall intervene and mark the boundaries before the first occupant shall have completed, or even commenced their alignment."

True, in that case the Supreme Court did not pass upon this question, inasmuch as it was not distinctly presented by the findings. The language therein used by the Court may be considered as *obiter dicta*; and it never has been regarded that general *dicta* are considered as establishing the law in cases turning on special circumstances. The language employed by the Court as to the proper application of the doctrine of relation in the location of a mining claim, comes with such force as to lead to the conclusion that when this point is fully and fairly presented, argued, and considered by the Supreme Court, it will be declared an absolute proposition and established rule of law. If a liberal construction be given to the Act of Congress, then in legal effect, he is prior in time who first goes upon the ground, begins work therein, indicates by his acts his intention to perfect a location under the mining laws, and local regulations, where such exist, and within a reasonable time aligns and marks the boundaries of his claim.

Benevolent statutes of the United States, passed in the interest and for the benefit of its own citizens, inviting and encouraging them to occupy the public lands should be liberally construed, and in such manner as to lend full protection to the settler or appropriator: *Silver vs. Ladd*, 7 Wall, 219.

"The Code establishes the law of this State respecting the subjects to which it relates, and its provisions and all proceedings under it are to be liberally construed, with a view to effect its objects and to promote justice." Sec. 4, C. C. P.

In this case it was only about 20 days from the time at which the defendant first went on the ground until he finally completed his location by making the exterior boundaries of his claim on the ground. In the meantime he was proceeding in good faith to ascertain and establish his right thereto, and as required by law. During which time plaintiff stepped in, claimed the ground, and took the steps indicated by the law to locate the same. The Court is of the opinion that the facts in this case show that the defendant is entitled to recover as against the plaintiff. The counsel for the defendant will draw findings in keeping with the views of the Court herein expressed.

J. S. BEARD, Judge.

Cyanide in the Black Hills.

Much interest has been manifested in the recent establishment of a cyanide plant in the Black Hills. The *Deadwood Times* has obtained the following data of the initial run from T. L. Taylor, secretary of the company, about two weeks since: 34 4-10 tons of ore were crushed to 20-mesh size and the pulp leached with 18 tons of solution containing one-half of one per cent of cyanide. Six hours were occupied in forcing it through the pulp, 18 hours in leaching, and 6 more for the gold and silver solution to pass over and through the zinc shavings in wooden boxes or troughs. These shavings, on which the gold and silver had settled, were then treated to a sulphuric acid bath in a large lead tub, which destroyed the zinc and left a residue of black powder containing the precious metals. This powder was then subjected to an intense heat in the refinery furnace, the result being 33.88 ounces of bullion, showing an extraction of 93 per cent of the assay value. The ore, previous to treatment, assayed \$20 gold and 70 cents silver per ton. This recovery of 93 per cent surpasses all previous records of any mill operating under the process. At the Mercur mill, in Utah, the first run showed a recovery of but 37 per cent. Each succeeding run improved, and it is now saving from 90 to 95 per cent.

Another thing about this initial run of our local mill is the small per cent of cyanide lost. The vats are all new, the bed consisting of gravel, cocoa matting and canvas, through which the solution had to pass to reach. The ore must have absorbed considerable, as did also the new wooden boxes in which the zinc shavings were placed. Yet, with all this absorption, the solution showed but a loss of 1 8-10 pounds. Another tank containing 42½ tons of pulp is now being leached, a longer time given the solution to more thoroughly decompose the zinc before removing the product to the refinery. The bullion from this will be recovered Sunday, and it is expected the loss of cyanide will yet be further reduced. In another vat in the mill are 12 tons of prepared ore from the White Swan mine, on Squaw creek, which will be leached in a few days. No more will be crushed until the new rolls are in place; with three sets the capacity of the plant will be 50 tons per day. The management says that the phenomenal success of the method justifies the statement that in the near future the Black Hills will have the largest and most complete mill in the world using the process. They have already expended over \$125,000, all but \$17,000 in this vicinity, the latter amount being paid to the MacArthur-Forrest people for the right of using the process, and \$5000 more will be paid them to-day for the same purpose. In addition to this the local company has to pay them \$1 per ton royalty for every ton treated. The process in itself is inexpensive, but with such demands for its use it has been found necessary to fix a rate of \$10 per ton for treatment.

Tuolumne Drift Gravel.

Abstract from Article in *Tuolumne Independent*.

Of late years the above class of mining seems to have been sadly neglected, whereas in former years hundreds of miners found therein most profitable employment. We cannot perceive the cause. The dead river beds of Table Mountain are certainly not worked out, neither is there a scarcity of water for sluicing purposes. It must be that the old drift gravel miner is gone—many dead; others, after having made a stake, taken to other pursuits—ranching, pocket mining, etc. The small claims have merged into company holdings, so that the individual miner finds it more difficult to get hold of the ground to mine on. Yet many of the company holders of these auriferous lands would be willing to sublet on a small percentage if sought after. It is a much surer class of mining than that of pocket hunting, but, perhaps, not quite so exciting. In the former, a man is pretty sure of making fair wages at every wash up, whereas, in the latter a man may spend years and barely get the color, yet he works on most stochically year after year, often getting hopelessly in debt.

It is our advice to those unsuccessful pocket miners—hie you to the Table Mountain, make up a party of say two to four men, lease some of the patented gravel mines, or take up an abandoned mine, stick together, open up your mine and you will surely do well. Now, for instance, the gravel will run from a foot or two to six feet; say it pays about 2½ cents per pan of 20 pounds. It takes 137 pans to make a cubic yard, which will give an average yield of \$3 45 per cubic yard. One man should break from one and a half to two cubic yards per diem, in easy ground, which in dollars will give him for his day's work \$6.90. Reduce this one-half, say one and one-half cents to the pan, he will then make \$3 45; allowing for his water hire, he still makes small wages daily. This last figure is very poor for drift gravel. If the gravel is six feet in depth, he can make good wages, even at the lowest figure, to say nothing about the crevices in the hard bottom of bedrock where the coarse gold is found. The bulk of the fine gold is generally found on the sides or the banks of rim rock; if the bottom is a soft open slate it will be found well down in it. Again, the rich streak is often found on a false bottom of pipe clay, or some sedimentary deposit. But the gravel miner keeps his pan at work and so traces his pay dirt. As a general thing, it does not take much timber to work these mines, as a cement floor is generally found above the gravel; so a few stulls is all that is needed, or a pillar of gravel can be left in places to steady the worked-out ground. Then all the large boulders or heavy rock should be thrown back into the worked-out blocks and filled in, which keeps the ground secure.

The proper way to work drift gravel mines is to first have an accurate survey made of the river bed and run your crosscut tunnel under the bed of gravel; tap the gravel by raises from the main tunnel, which is drifted up and down stream. This relieves your mine of the water. Your mine is dry, the water so much met with is used in the sluices to wash up your pay dirt. It is a mistake to sink for drift gravel; that may be one reason why gravel drift mining has fallen into disrepute. Many mines have tapped the gravel beds too high, hence they have to sink and must then contend with water, which must be pumped out or hoisted by bucket; hence it takes a much higher grade of gravel to pay for the labor extracting it.

Scientific Progress.

Origin of Anthracite.

The main difference between anthracite and bituminous coal is that the former is devoid of volatile matter. Heretofore, the theory generally accepted to account for this difference was that presented a half century ago by Prof. Rogers while conducting the first geological survey of Pennsylvania. Observing that the anthracite beds lay in the eastern part of the State, in close proximity to the Archean axis of elevation, he surmised that these coal beds had, so to speak, been "coked," upon the elevation of the Appalachian chain; that is, he supposed that the heat and pressure accompanying the Appalachian elevation, acting most vigorously near the axis, had distilled and removed the volatile matter of the coal beds nearest it.

To adjust the theory to increasing facts, Prof. Lesley added the supposition that the heat involved in this theory was brought up by conduction when the superincumbent layers of rock were extremely thick, which have since been mainly removed by the erosive agencies which have been active over the region for millions of years.

The inadequacy of these theories has led Prof. J. J. Stevenson, of the University of New York, to propound another and simpler theory, which was ably defended by him at the recent meeting of the Geological Society of America.

He would account for the lack of volatile matter in anthracite coal by the simple fact that it had been longer exposed to that kind of decay which takes place in vegetable matter when immersed in water, and which consists chiefly in the loss of hydrocarbons which constitute the volatile elements in bituminous coal. On this supposition, the anthracite beds are those which were formed earliest in the swamps and lagoons of the carboniferous period, and remained longest devoid of the covering of sedimentary deposits which subsequently preserved them from further change.

This theory is confirmed by the fact that there is no such strict relation of the anthracite beds to the Appalachian axis elevation as Prof. Rogers had supposed, and by many other considerations which Prof. Stevenson is about to publish. This simple cause seems adequate to account for all the phenomena, and probably solves one of the long-standing mysteries of geological science.—From the Independent.

A Recent Report on the "Grip."

It is about four years since the epidemic influenza began its ravages in this country, having been originally imported from Europe; and, having become domiciled, it has now entered upon its fifth season of mischief in the United States, although, fortunately, not with the same severity that has characterized its previous prevalence, says the *New York Tribune*.

An official report on this malady by medical officials connected with the Local Government Board of Great Britain has recently made its appearance. Therein the existence of an influenza bacillus is reaffirmed. Dr. Klein says that this microbe "is always abundantly present in the bronchial secretions of patients," and "diminish in number as the disease is abated." The germs are disseminated, according to Dr. Parsons, by bringing the affected and healthy together, as in public vehicles and places of meeting, and especially by the poison being present in confined and vitiated air. Dr. Caldwell Smith says: "An individual is affected by breathing at once the expired air from a person suffering from the disease, and I believe this to be the only method of infection." Numerous stories are told to show how the malady is carried from place to place. A music teacher visited two relatives

who were victims of it, and three days later was himself attacked. However, he made a round of his pupils before succumbing, and two days afterward ten of them also developed the disease. The ordinary intercourse of a household or business office, letters written and sealed by sufferers, finger account books whose leaves have been turned with moistened finger-tips by affected persons, and riding in close and crowded railway cars, are among the most common methods of propagation.

Isolation of patients, disinfection of rooms, and ample ventilation are strongly urged as preventive measures. At Brighton, the inmates of the borough sanatorium were protected effectually by such precautions as these for two successive seasons, and during a third season the only case was that of a servant returning from a distant place where the disease was prevalent. When she fell ill she was promptly isolated, and thus no one else was affected.

Action of Oxygen in Asphyxia.

With regard to the physiological action of oxygen in asphyxia, more especially in coal mines, a committee of the British Association has arrived at the following conclusions:

1. In the case of rabbits asphyxiated slowly or rapidly, oxygen is of no greater service than air, whether the recovery be brought about in an atmosphere contaminated by carbonic acid or completely free of carbonic acid, and whether artificial respiration be resorted to or not.

2. Pure oxygen, when inhaled by a healthy man for five minutes, produces no appreciable effect on the respiratory rate and volume, nor on the pulse rate or volume.

3. Oxygen, whether pure or somewhat diluted, produced no effect on one particular patient, who suffered from cardiac dyspnea of moderately severe type, in the direction of ameliorating the dyspnea, and, compared with air inhaled under the same conditions, produced no appreciable effect, either on the respiratory rate and volume or on the pulse rate and volume.

4. An animal may be placed in a chamber, the general cavity of which contains about 50 per cent of carbonic acid, and retained there for a long time without superintention of muscular collapse, provided a gentle stream of respirable air gas or oxygen, indifferently, be allowed to play upon the nostrils and agitate the surrounding atmosphere.

The Earth's Motion Made Visible.

In the December issue of *Popular Astronomy*, Eliza A. Bowen shows how the earth's revolution may be made manifest to the eye. Dr. L. Smith, in *Popular Astronomy*, says: Place on the floor of a room free from tremors and air currents a good-sized bowl nearly filled with water, and sprinkle over the surface of the water an even coat of lycopodium powder, and across this make a narrow black line of pulverized charcoal. Place the bowl so that the black line shall coincide with a crack in the floor; or, if the room be carpeted, lay a stick upon the floor exactly parallel with the mark. After a few hours it will be found that the line is no longer parallel with the stationary object, but has moved from east to west, proving that during this interval the earth has moved from west to east.

The reason appears to me to be that the solid floor has, with the earth and bowl, moved from west to east, and so has the water also, but at a slower rate, as there is a slight inertia, of which the yielding liquid does not instantly partake, to be overcome. It will be seen that the line or charcoal mark always moved from east to west.

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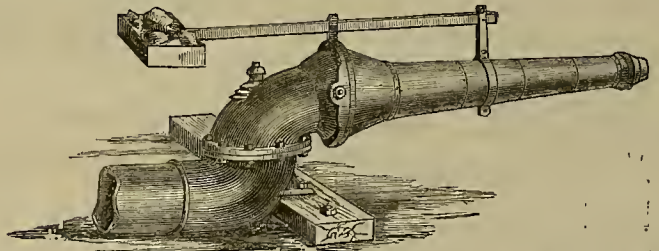
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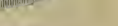
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Mechanical Progress.

Making an Ax.

On entering the main workshop, the first step in the operation which is seen is the formation of the ax-head without the blade, says an exchange. The glowing flat iron bars are withdrawn from the furnace and are taken to a powerful and somewhat complicated machine which performs upon them four distinct operations, shaping the metal to form the upper and lower part of the ax then the eye, and finally doubling the piece over so that the whole can be welded together. Next the iron is put in a powerful natural-gas furnace and heated to a white heat. Taken out, it goes under a tilt-hammer and is welded in a second. This done, one blow from the "drop" and the poll of the ax is completed and firmly welded. Two crews of men are doing this class of work, and each crew can make 1500 axes per day.

When the ax leaves the drop there is some superfluous metal still adhering to the edges and forming what is technically known as a "fin." To get rid of the fin the ax is again heated in a furnace and then taken in hand by a sawyer, who trims the ends and edges. The operator has a glass in front of him to protect his eyes from the sparks which fly off by hundreds as the hot metal is pressed against the rapidly revolving saw. The iron part of the axe is now complete. The steel for the blade, after being heated, is cut by machinery and shaped. It is then ready for the welding department. A groove is cut into the edge of the iron, the steel of the blade inserted, and the whole firmly welded by machine hammers. Next comes the operation of tempering. The steel portion of the ax is heated by being inserted in pots of molten lead, the blade only being immersed. It is then cooled by dipping in water, and goes to the bands of the inspector. An ax is subject to rigid tests before it is pronounced perfect. The steel must be of the required temper, the weight of all axes of the same size must be uniform, all must be ground alike, and in various other ways conform to an established standard. The inspector who tests the quality of the steel does so by hammering the blade and striking the edge to ascertain whether it be too brittle or not. An ax that breaks during the tests is thrown aside to be made over.

Before the material of the ax is in the proper shape it has been heated five times, including the tempering process, and the ax, when completed has passed through the hands of about 40 workmen, each of whom has done something toward perfecting it. After passing inspection the axes go to the grinding department, and from that to the polishers, who finish them upon emery wheels.

Improved Brakes.

The *Railroad Gazette* says that the Pennsylvania Railroad will shortly have all passenger cars equipped with the quick-action brake, and the locomotives equipped with the automatic engineers's valve. The process of changing from plain automatic to the quick-action brake has been going on for some time. The large number of cars and engines to be changed has necessarily delayed the matter until the present time. This shows the way in which brake matters are drifting, namely, toward the most powerful quick-acting and efficient brake that can be obtained for passenger service. Perhaps this turn in brake matters is emphasized by the investigation now being made into the efficiency of reinforced brakes.

The reinforced brake has been brought out to do better work and more powerful braking than can be obtained from a quick-acting brake. It is found that in face of danger the length of stop, even with the quick-acting brake, is so great as to result in accidents, more particularly collisions. The reinforced brake is an improvement on the

quick-acting brake. It does not make the brake act quicker; it makes it more powerful during the first part of the application, while the train is running at high speed. The reinforcement comes during the early part of the application, and is reduced as the speed reduces, in order to prevent sliding the wheels. This reduction is also necessary in order that the maximum braking efficiency may be obtained, for the reason that if brakes were applied with the reinforced pressure at low speed the wheels would slide, and when the wheels do slide the retarding force is greatly decreased. There can be no doubt of the necessity of using quick-action brakes wherever possible and the reinforced brake for all high-speed trains; and it would appear, from present indications, that in the future it will be as necessary to use the reinforced quick-acting brake as an improvement on the plain quick-acting brake, as it now is necessary to use the latter in place of the plain automatic.

Water Proof Masonry.

What was at first considered a doubtful experiment, viz., the use of coal tar as a means of rendering masonry impervious to water, especially in positions exposed to direct contact with the latter, has proved a practically valuable resort. Used as a coating for masonry built up of very porous stone, tar renders it very impervious, even at a depth of some 50 feet of water, and, according to the opinion of those whose experience has been extensive with it, the article should be utilized in all public buildings, particularly those designed for the preservation of works of art, the dissolving action of water, even upon mortar of superior quality, being well known, and also the favorable effect of the exudation of water charged with lime salts from the mortar. Two methods of using the tar are named, viz., in a boiling state in one of several layers, this being suitable for surfaces exposed to the air; or it may be made to flame up before using, this being appropriate to surfaces which have to be covered up. It is stated that when boiling coal tar is employed in three coats on masonry the result is a black and very brilliant varnish, which perfectly resists the action of frost, water and sun, being likewise absolutely impervious; and the tendency of the black coating to absorb heat may be overcome by white-dusting the whole before the tar is quite dry.—National Builder.

A Twelve-Mile Gun.

In a paper read before the Western Society of Engineers, Captain W. H. Jaques says: "The wire-wrapped type had the honor of firing the 'Jubilee Rounds' in the Queen's Jubilee year, and gave wonderful results. On April 16, 1888, was fired at Shoeburyness the first of a series of rounds intended to investigate the conditions attending firing at very long ranges. The gun selected was a 9'2 gun, made under the direction of General Maitland in the Royal Gun Factories. The weight of the gun was 22 tons, that of the projectile 380 pounds, which, fired with a charge of 270 pounds, gave a muzzle velocity of 2360 foot seconds. The elevation of the first round was 40°. The projectile fell at a range of about 21,000 yards, or nearly 12 miles. On July 12, at 43° elevation, a range of 21,600 yards was attained, and on July 26, with 45° elevation, the range was 21,600, or about 12 1/4 miles. The projectile remained in the air about 69 1/2 seconds, and its trajectory reached a height of 17,000 feet, or about 2000 feet higher than the summit of Mount Blanc."

Who Invented the Lightning Rod?

It was said a little while ago that an obscure Hungarian priest was the inventor of lightning rods, and not Benjamin Franklin. Now a German Egyptologist, Herr Heinrich Brugsch, claims that he has ample proof that the ancient Egyptians used a form of

lightning rod for protecting their temples against discharges of atmospheric electricity, and that Franklin merely reinvented the same device. But, until he can prove that Franklin was aware of what the ancient Egyptians had done in this direction, the American is just as much entitled to be regarded as an original inventor.—Invention.

Useful Information.

The Loudest Noise Ever Heard On Earth.

No thunder from the skiea was ever accompanied with a roar of such vehemence as that which issued from the throat of the great volcano in Krakatoa, an islet lying in the Straits of Sunda, between Sumatra and Java, at 10 o'clock on Monday morning, August 27, 1893. As that dreadful Sunday night wore on the noise increased in intensity and frequency. The explosions succeeded each other so rapidly that a continuous roar seemed to issue from the island. The critical moment was now approaching and the outbreak was preparing for a majestic culmination.

The people of Batavia did not sleep that night. Their windows quivered with the thunders from Krakatoa, which resounded like the discharge of artillery in their streets. Finally at 10 o'clock on Monday morning a stupendous convulsion took place, which far transcended any of the shocks which had preceded it. This supreme effort it was which raised the mightiest noise ever heard on the globe. Batavia is 95 miles distant from Krakatoa. At Carimon, Java, 355 miles away, reports were heard on that Sunday morning which led to the belief that there must be some vessel in the distance which was discharging its guns as signals of distress. The authorities sent out boats to make a search; they presently returned, as nothing could be found in want of succor.

The reports were sounds which came all the way from Krakatoa. At Macassar, in Celebes, loud explosions attracted the notice of everybody. Two steamers were hastily sent out to find out what was the matter. The sounds had traveled from the Straits of Sunda, a distance of 969 miles. But mere hundreds of miles will not suffice to illustrate the extraordinary distance to which the greatest noise that was ever heard was able to penetrate. The figures have to be expressed in thousands. This seems almost incredible, but it is certainly true. In the Victoria plains, in West Australia, the shepherds were startled by noises like heavy cannonading. It was some time afterward before they learned that their tranquillity had been disturbed by the grand events at Krakatoa.—From the Youth's Companion

History of the Calla Lily.

This was first introduced to Europe from Southern Africa in 1687, and has become a great favorite with cultivators all over the world, says *Meehan's Monthly*. It does not like a very warm temperature nor a very cold one. It will live out in American waters, provided it is deep enough to be below the reach of absolute ice. It fills the ditches and narrow creeks in Cape of Good Hope, much the same as our spatterdock would here. It was removed, by Kunth, from the genus *Calla* and called *Richardia Africana*, but it is not easy to get rid of a name which once gets into general use, hence it still goes by the name of *Calla*. The spotted one, common in cultivation during the last few years as the *Richardia albomaculata*, was also introduced from Southern Africa in 1859. This is well known by its spotted leaves. Another one was brought from the same country in 1857, under the name of *Richardia hastata*—the spathe being of a yellowish color, but very small, and is not yet much known. On account of the common calla blooming most freely in the

spring of the year, it has come into general use for Easter decorations; and not unfrequently receives, with a number of other plants, the common name of Easter lily.

The Best Preservative Paint for Iron-Work.

Mr. W. Thomson recently read a paper before the Manchester Association of Engineers on "The Influence of Some Chemical Agents in Producing Injury to Iron and Steel," in which reference was made to the effects of different paints and varnishes used for the preservation of structural iron and steel from rust. From experiments made by himself, Mr. Thomson has arrived at the conclusion that red lead paint is the best preservative. This result has struck him as remarkable, because red lead is a highly oxidizing substance; but the reason was found to be that red lead had the effect of producing a skin of the unoxidizable and protective black or magnetic oxide on the iron itself under the paint. The author has also found that other oxidizing agents, such as manganese dioxide, form a paint which preserves iron from rusting; and this discovery he regards as of great industrial importance. Mr. Thomson explained that, having been required some time ago to make a considerable number of experiments to ascertain the most suitable paint for protecting a large iron structure from the action of sea-water spray and rain, he arrived at the conclusion that red lead paint was the best he could find for the purpose. Mr. John West, a vice-president of the society, who presided on the occasion of the reading of the paper, supported the statements and views of Mr. Thomson that red lead is the best preservative paint for ironwork. The chief novelty brought out in the paper was the reason why red lead is so efficient in protecting iron.

A Note About Water.

Where does all the water in the sea come from, is a question that many a small boy has asked his father, and which many a father has found himself utterly unable to answer. Some idea of where it comes from may be gathered from a glance at the following table of the hourly quantity of water discharged into the sea annually by some of the best-known rivers of the world. It was compiled by an expert and may be accepted as accurate:

River—	Million Cubic Feet per Hour.
Amazon	3700
La Plata	3100
Mississippi	2070
Volga	1120
Danube	950
Ganges	700
Nile	560
Rhine	230
Elbe	100
Seine	80
Thames	40

This, of course, throws the question back a step. The question becomes, where does the water in the rivers come from? When that is answered by the statement that it comes from the hills we have gone about as far as we can go. Water is an element, and what its original source may be no man knows.—From Harper's Young People.

Reversible Boot Heels.

An English firm has recently been granted letters patent for an invention whereby heels of boots and shoes can be easily detached and reversed. The invention consists of steel, or any similar material, shaped as a lift, with flange and groove, by the first of which it is fixed in any part of the height of the heel, at the option of the maker, while the upper portion of the heel is so constructed as to slide into position so that it is indistinguishable from an ordinary heel; but to insure absolute security a fine screw is inserted from the inside. The advantages claimed for it are that when the top piece becomes slightly worn down the wearer can reverse it to the other boot, and after these have been well worn they can be replaced by a new set at a very small cost.

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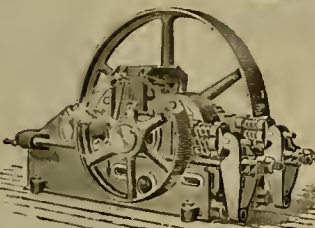
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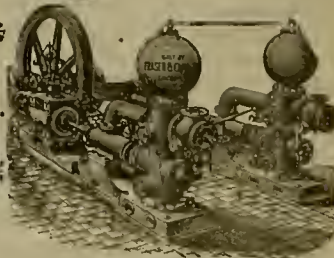
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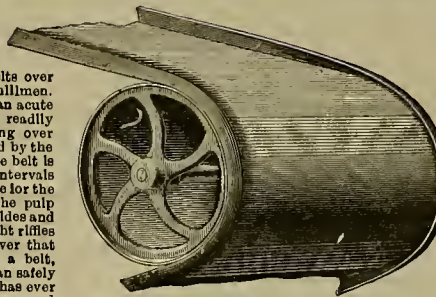
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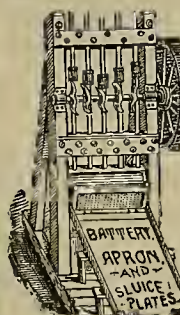


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Electricity.

The Headlight of the Future.

Electric headlights for locomotives will probably come into general use within a few years. Indeed, it will not be surprising if some States pass a law compelling companies to substitute them for the present means of illumination. Eminent authorities agree that many collisions, involving great loss of life and property, could have been averted had the engineers been able to see more than the few hundred feet lighted by the oil reflector. Several of the terrible disasters resulting to the World's Fair special trains, just before the close of the exposition, were mainly due to this fact. The evidence brought out by the coroner's inquest after one of these accidents showed that the night on which it occurred was very dark and foggy, and that the train employees could scarcely see 200 feet beyond the engine's pilot. One of the engineers testified that if he had had a few hundred feet more space he could have brought his train nearly to a stop and greatly diminished the effect of the collision.

While several railway companies, including the Southern Pacific, are experimenting with improved headlights, the Georgia Southern and Florida is one of the first, if not the first, line in the country to use the electric light regularly in operating its trains. In a letter to the *Manufacturers' Record*, Receiver W. B. Sparks writes as follows:

"We have eight electric headlights. They cost about \$375 each in place on the locomotive. The cost of maintenance is not greater than the oil light. An old headlight will not throw its light on a very dark night more than 150 feet, and it is impossible for an engineer to slow up his train in that distance, even with the emergency brake. The electric light throws its light from one-half to three-quarters of a mile. Obstructions can be easily seen at that distance, and some of our engineers claim that a switch disk can be more easily detected by it at night than in the daytime. These lights do away with switch lights, which is quite a saving to roads that use them to any great extent.

"Railroads such as ours, running through the pine lands of the South, kill a great many cows. During our rainy season the lands along the line of road become very wet; in places they are entirely covered with water, and the cattle come down upon track seeking some dry spot on which to sleep. We have killed, when we used the old headlight, as many as 13 at one time, and our claims for stock killed per month have sometimes amounted to over \$1000. The engines using the electric headlight have never killed a cow, and I am confident that the saving in stock claims alone will more than pay for the lights within the next two years."

Electricity Defined.

Prof. Galileo Ferraris, a well-known Italian physicist, has defined electricity in clear terms. Asked what electricity is, his answer was given to the following effect:

Maxwell, he wrote, has demonstrated that luminous vibrations can be nothing else than periodic vibrations of electro-magnetic forces. The experiments of Hertz established the fact that electro-magnetic oscillations are propagated like light, and thus the theory of Maxwell has secured experimental confirmation. Out of these experiments and theories have originated the idea that either the luminiferous ether and the seat of electric and magnetic forces are one and the same thing—that, in a word, light is electricity and electricity is light. This being established, the answer to the question, "What is electricity?" becomes easy. Electricity is not only the powerful agent which occasionally tears and rends the air, shaking

the earth with the terrible thunder which marks its progress through the atmosphere, but it is also the life-giving agent which sends forth from heaven to earth, in company with beneficent light and heat, the magic of colors and the breath of life.

It is electricity which makes the heart beat to the palpitations of the external world, which gives birth on the human face to expressions of emotion, and thus has the power to transmit to the soul the enchantment of a look and the grace of a smile. This definition is poetical and fanciful, no doubt, but on the whole it describes the genesis and influence of the complex force, electricity, with more clearness than is usual with scientists.

Electricity of the Skin.

In his last published work Professor Yarchanoff, of St. Petersburg, gives the results of his researches with the electric currents of the skin. As stated, these experiments led him to connect the skin of various parts of the body by means of non-polarizable clay electrodes with Meissner's galvanometer, and at such times the various stimuli of the skin—such as light tickling with a brush, heat, cold, a needle prick, sound, light, taste and smell—were noticed, and in all these cases a strong deflection of the galvanometer needle was observed. Merely opening the eyes, after they had been closed for some time, produced a considerable deflection; and mental efforts, like calculation, also had a similar effect. These currents, if they exist, it is remarked, must pass off with the moistened deposits which are being constantly expelled and a new supply of electricity would have to be found somewhere; and such electricity, says Prof. Yarchanoff, having its source perhaps in the decomposition of metals, taken in the food we eat and the air we breathe, must of necessity entail upon the organism a continuous strain in its production, it being from such causes, perhaps, that the body becomes fatigued after a comparatively few hours of exertion, and absolute rest becomes necessary for recuperation.

To Purify Sewage.

That electricity is a giver of life has been proved by many of its recent applications to farming, etc., and that it is equally a destroyer of life has been demonstrated in a variety of ways. Its latter qualities are further shown by Albert E. Woolf, who has devised a method of disinfecting sewage by the electrolysis of sea water. At Brewsters, a small town about 20 miles from New York, it was found that sewage was percolating through a marsh into one of the streams from which New York derives its water supply. To remedy this, we are told, a steam plant of 15-horse power has been put down for purification of the Brewsters sewage. The dynamo furnishes 700 amperes at a pressure of five volts, a current amply large enough to electrolyze and thoroughly disinfect the liquid sewage which was the source of all the danger.

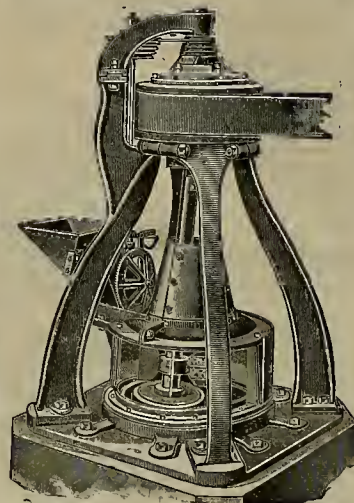
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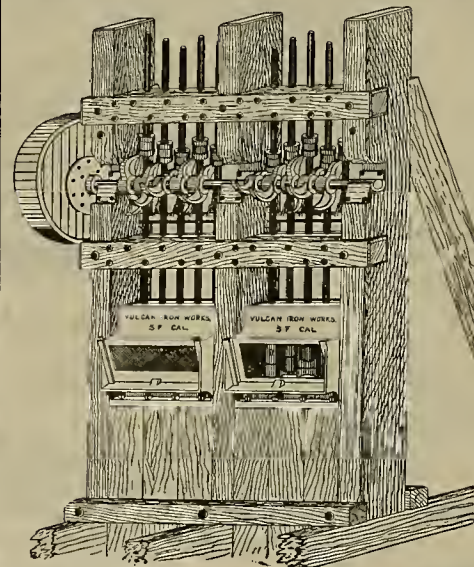
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Mining Summary.

The following is mostly condensed from journals published in the interior, in proximity to the mines mentioned.

CALIFORNIA.

Butte.

STRUCK A LEDGE.—Forbestown *New Era*, Jan. 25: It is reported that the Palo Alto mine, on the Mountain House ridge, near Merrimac, has tapped an extensive quartz ledge in a new tunnel they have been running.

It is reported that F. W. Dunn, a Nevada State capitalist, who was in Forbestown last week, secured an option upon the Denver mill and mine, owned by G. W. Price. The bond is to run 60 days, and the reported price to be paid for the property is \$24,000. The Denver mine and mill is situated in the Forbestown mining district, about 2½ miles east of the town. The mill is new, having been in operation only one month; substantially built, first-class in every particular, and has ten stamps. The ledge from which the ore is obtained is well defined, and, everything considered, is a desirable piece of property.

Mr. Dunn while here visited a number of ledges upon which work is being done, and made a careful examination of them. He seemed favorably impressed with what he saw, and will return again to make further investigations. He is a man who has had much experience in quartz mining, and is backed by capital.

The Bullion mill is about ready to commence crushing rock. This mill, as our readers know, is owned by citizens of Forbestown, and has 10 stamps. The work of building the mill was commenced about the first of December last, has been delayed by bad weather, but now everything is in place save the driving belt, and that will be in a day or two—probably before this notice is read. This company has a large amount of ore already out, and the mill will be operated to its full capacity from the start. That the ore is first-class there can be no doubt. One of the ledges from which the company will take ore is known as the Keystone. It was prospected by the Plumes-Enreka Company last summer under a bond from the then owner, Mr. Reasoner. While the company found the ledge to contain good ore, it was not of sufficient width to furnish rock enough to keep a mill the size they wished to build running. They did not wish any ledge that would not justify the building of a 40-stamp mill, therefore forfeited their bond. The ore to be first worked by the new mill will be taken from the Bullion ledge, near which the mill is built, which can be handled with but little expense.

The machinery for the new air compressors that are now being placed in the Gold Bank mine at Forbestown has arrived. The last shipment required seven wagons to haul the same from Oroville to the mine. The machinery will be placed in position as fast as possible. H. P. Stow, the superintendent, is every inch a miner, and very enthusiastic in his work, and has surrounded himself with assistants who are competent and take great interest in their work.

Sinking on the Shakespeare's new shaft is being pushed as rapidly as possible, three shifts being employed.

NEW HOISTING WORKS.—*New Era*: H. P. Stow has a force of men at work on his quartz mine in French ravine, near Hurlston. The shaft is now down 160 feet, with two levels. Hoisting works, to be run by water power, are now being put in. There is a probability that a mill will be erected shortly.

Inyo.

THE BLACK WARRIOR.—*Independent*: Tressel & Mann are at work developing the Black Warrior mine, about six miles west of Big Pine. There is a shaft sunk about 110 feet in the ledge, and at a point 60 feet from the surface a tunnel has been run 200 feet along the ledge. The ore assays about \$23 a ton all through, and is free-milling gold. The mine is about 300 yards from Big Pine creek, and there is plenty of timber all around it. The ledge is about a foot thick, has clearly defined walls, the hanging being slate and the foot granite with clay casings. There is every indication of the mine developing into a permanent and valuable property.

WORKING ON GALANA.—*Big Pine Cor. Register*: The mining outlook for this section is flattering. M. H. Bush and Supervisor Uhlmeier began operations on their galena near Alvord yesterday. Experts pronounce this to be an excellent property. D. M. Tressel and J. N. Munn, owners of the Warrior mine on Big Pine creek, have resolved on the thorough development of this claim, and will seek out the condition of the lead at a depth. Dave Pitman, J. R. Eldred and Uncle George L. Cornell left last week for their lead claims in Lead canyon, and will take out a shipment of ore. The developments at the Montezuma by J. H. Coe and Andy Fife, the persistent prospector, indicate that their faith in this celebrated property is not misplaced.

Kern.

AN OUNCE A DAY.—Of the new gold fields in Kern county, of which so much has been said lately, the *Californian* says: A brief note received from Mr. Sherman, the *Californian's* expert now investigating the desert placer mines, states that the average results secured by the miners in Redrock canyon are an ounce a day. The best reported in any day was 15½ ounces. The pay dirt lies close to the surface, and covers a wide extent of territory.

Nevada.

RAPIDLY COMING TO THE FRONT.—*Union*: The Centennial mine is now entirely clear to the 650-foot level, which is the bottom drift. A fine ledge is exposed in this level, also in the 600 and 500 levels. The tributaries at work in

the mine continue taking out some very handsome looking quartz, and will have a crushing just as soon as the roads become passable, so that the rock can be hauled to the mill.

TWENTY-FIVE MEN WORKING.—*Herald*: The impression prevails that the Champion is entirely closed. This is not true. There are still 25 men at work there—quite a respectable force.

GRAVEL STRUCK.—*Union*: James Andrews, an old-time and well-known miner, says he and his partners have struck pay gravel in the old Enreka claim which they have been prospecting on the Blue Tent road.

CLAIM BONDED.—Mr. James M. Lekanian has informed the *Union* that he and co-owners have bonded a small claim situated on Gold Hill near the Scadden Flat mine to James D. Hogue, Esq. The property is in a good locality.

Mariposa.

GOOD PLACERS.—*Gazette*: Some very rich placer ground has just been discovered above Mariposa, around the Ludwig mill. The ground there has never been worked, and it has been found to be full of flour gold.

Placer.

GOON GRAVEL.—*Colfax Sentinel*: At the Foss mine at Lowell Hill, of which Geo. Woods has charge, last week a test was made of the gravel through which the main tunnel is being driven, and it paid better than any heretofore to the running foot. At present the mine is being put into shape for drifting, and in the spring more men will be put on.

Parties at Forest Hill have leased the Homestake mine near there, and will begin work on the property again.

The dam at the Polar Star mine at Dutch Flat is being raised, and it is expected soon to proceed with the work in the mine.

The mill at the Gold Ring mine at Green valley is now ready for operation and will be crushing cement next week. Supt. Ames is an expert millwright and has had considerable experience in setting up mills. It was an extremely arduous task to bring the heavy machinery from the top of the mountain ridge on the Iowa Hill side down to the river thousands of feet below. A chute was built for this purpose and the ponderous mortars and other heavy machinery were thus taken down. It was quite a feat, and that the mill is all ready for work is due to the skill and energy of Supt. Ames and his efficient foreman, L. C. Jacobs. Over 600 feet of eight-inch pipe have been made on the ground, and nearly 700 feet of ditch dug, in order to gain the power for the mill. The Gold Ring gives every promise of becoming one of the paying mines of Placer county.

Plumas.

MINING PROGRESS.—*National Bulletin*, Jan. 25: Work at the Riverdale mine is progressing favorably. There has been some delay, owing to the difficulty of getting machinery in from Chat at this season of the year. It is expected that sinking will begin within ten days at furthest.

At the Mills shaft last week a big lot of water had to be contended with, but the machinery has proved equal to the occasion, and work is progressing as usual.

Owing to the great volume of water now in Spanish creek, the Quincy Mining & Water Co. will defer work on the big stone dam until spring. They have begun the construction of a "rock-crib" dam in Wapamsee creek, the site agreed to by the Debris Commissioners. About 15 men are now at work on this dam. When completed, behind it will be a large impounding reservoir, which will enable the company to utilize the water season in hydraulic lifting at this point. The structure will be very substantial and prevent any debris from reaching Spanish creek.

The mining outlook for Plumas county is brighter than it has been for many years past. The indications are that we shall have an early spring, which will open with unusual activity in mining circles, especially in the vicinity of Quincy. An era of prospecting and development work in different parts of the county will be inaugurated, and the county will be visited by numerous mining men in search of properties to invest in, or to develop those in which they have become interested already.

The Green Mountain mine has a number of men employed, and 25 stamps are steadily crushing ore from it. With means to develop and operate it properly, this would soon become one of the best and largest mines in the State.

Riverside.

FIVE-STAMP MILL.—*Banning Herald*: An immense five-stamp mill was side-tracked near the local station this week. It came from the defunct Temescal tin mines, where it was used for sampling. It was purchased by the Morongo King Mining Company. Another five-stamp mill with engine for the same enterprising company is en route from San Francisco.

San Bernardino.

VANDERBILT M. AND M. COMPANY.—*Shaft*: People in camp are wondering which mill will be in operation first—Campbell's or the one at the Bronze. Campbell's mill is on the ground, but when will the repairs be here? is the question. The mill for the Mining and Milling Company is liable to be here any day, and will be all ready to put up. Mr. Smith is not letting the grass grow very much on the ground that is to be graded. The sound of the shooting in which he indulges, in order to get the hard rock out of the way, sounds like a five-gun battery. The grading, which was a very hard job, is now just the same as completed. The three winzes and double-compartment shaft, which are being sunk from the lower level, will soon be down another hundred feet, and then another drift will be run to connect them, and will be at least 500 feet long. At the lowest point yet reached in the mine, the indications

are more than satisfactory, the vein taking up almost the entire width of the winze. It seems more than likely that a very large ledge will be struck a little lower down. The ore taken from the bottom of the winzes and shafts will average better than at almost any other part in the mine.

Ventura.

GOON PROSPECT.—*Venturian*: Harry Meyer has just returned from a three months' prospecting tour over in the Pirn section in the northeastern part of this county. He reports an excellent prospect in gold quartz, and says that many abandoned claims, worked years ago, are being relocated. There is a lot of gold in that section, and he thinks that it will lead to a boom. The Fraser mine is located in that same section. It has been in litigation for a long while, but is now settled. Mr. Meyer says that their tunnel has uncovered a ledge of great thickness. There is enough of this in sight to keep the ten stamps of the mill now there at work for ten years.

NEVADA.

Washoe District.

SUMMARY OF COMSTOCK OPERATIONS.—The official letter of last week's operations in the Consolidated California and Virginia mine reads as follows: "1650 level.—In our workings in and from the drift run north from the foot of the upraise which was carried up from sill floor of this level we have extracted a few tons of ore of ordinary value. The drift running north from the east crosscut No. 1 from the drift run north from the winze (down 52 feet) at a point 40 feet north from the winze has been advanced 19 feet; total length, 185 feet; face in porphyry, clay and quartz, from which a few tons of ore have been saved. The west crosscut No. 2 from the drift run north from the winze (down 52 feet) at a point 126 feet north from the winze has been advanced 32 feet; total length, 72 feet; face in porphyry, clay and quartz. The total quantity of ore extracted from the mine during the week was 57 carloads—about 56 tons—averaging \$29.85 per ton. The largest portion of this ore came from our workings in the vicinity of the winze—20 feet down. The southwest drift (the Rule drift) from the 1000-foot station of the Con. Virginia shaft has been advanced during the week 62 feet; total length, 453 feet; face in porphyry, clay and quartz of nominal value. The course of the drift continues the same as reported last week.

The weekly letter of the superintendent of the Best & Belcher mines contains the following: "200 level.—At a point in the northwest drift, 170 feet from our north boundary, have started an east crosscut, No. 3, and extended same 15 feet during the past week; face in soft porphyry. 900 level.—The east crosscut on north line has been advanced 14 feet; passing through hard porphyry; total length, 302 feet."

Following is a summary of the official news from other Comstock mines: In the Ophir the north drift from the west crosscut on the 1465 level is in 89 feet, with the face in porphyry showing clay separations. The old Central tunnel has been repaired and retimbered a total distance of 345 feet. In the Mexican the west crosscut from the south drift from the upraise, 45 feet above the 1465 level, is in 160 feet; the face is in porphyry carrying clay separations. On the 900 level of the Union shaft the Union Con. and Sierra Nevada joint north drift is in 393 feet; the face is in clay and porphyry. They have started a joint east crosscut from the south drift near the north line of the Union Con. mine. The Sierra Nevada south drift from the intermediate tunnel in Cedar Hill is in 388 feet; the face is in hard porphyry. In the Andes mine the north drift from west crosscut No. 2 on the 420 level was advanced 15 feet; the face continues in quartz. In the Gould & Curry mine, on the 200 level, west crosscut No. 5 from the northwest drift is in hard porphyry.

The official letter from the Potosi mine says: "The south drift on the 450 level is out 33 feet; face in low-grade quartz. The east crosscut, 300 feet south of north line, 750 level, is out 107 feet; face in porphyry. The repairs to the south drift on 930 level are not yet completed." In the Chollar mine the south drift on the 100 level is out 12 feet; face in low-grade quartz. Are repairing the north compartment in the main shaft below the 800 level. Extracted and sent to the mill the past week 96 tons of ore from the 100 level. Milled during the week 109 tons. On hand at mill 74 tons. Average battery assays, \$19.19; car-sample assays, \$21.13. In the Hale & Norcross mine they continue to stop ore from the winze below the 1300 level and extracted during the week 11 cars of ore assaying \$30.48 per ton, per car sample, and 21 cars of ore, average assay per car sample \$20.76 per ton. At the Ward shaft the west drift from the station, 820 level, is out 485 feet from the shaft; face in clay and porphyry. Repairs to the old Alta shaft continue. At the Alta mine they sank the 725-level winze 14 feet; total length, 22 feet; and the width of the ore continues about the same. They have saved about six tons of ore that will average \$26 per ton.

Ferguson District.

LOW GRADE ORE PLentiful.—*Pioche Record*: A number of claim owners hereabouts are anxious that the mills in the vicinity should start up. In all probability the mills will be kept busy on ore from this district from the time they drop stamps. So-called low-grade ore—that is, ore running below \$40 a ton—is plentiful, and a dozen different claims offer inducements for work if ore of \$20 could be made to pay a profit.

Nearly every claim on which much work has been done in this district shows up promisingly. One of the latest is the Paymaster, situated about a mile east of town and about the same distance north of the April Fool. Jos. Bryant and John Reese have put down a 26-foot shaft, exposing a fine face of mineralized quartz from five to seven feet in width with assays running from \$9 to \$100 a ton in gold. It is believed to

be the same mineral belt as that on which the April Fool and Monitor claims are located. The work still continues, and shipments to mill will be made as soon as the mills will receive them.

Jumbo District.

JUMBO AND WASHOE ORE.—*Enterprise*: E. W. Harris, of the Harris mine in Washoe district, says that it is reported that a rich streak of gold-bearing quartz has been found in the Smith mine, and also that rich ore has been found in the Berry mine in Jumbo district, which adjoins Washoe. The Berry mine is named after Harry Berry, a Comstock miner who has been prospecting in Jumbo ever since the discovery of that district, and while heretofore not making any important developments, has taken out sufficient ore to pay expenses. Mr. Berry is very reticent about his recent discovery, and belongs to that class of prospectors who "say nothing but saw wood."

Silver Star District.

A NEW CAMP.—Silver Star district is now attracting the attention of mining men, says the *Walker Lake Bulletin*. Old prospectors who have visited the district declare that it gives evidence of being the best camp ever seen in the county. The country is taken up for about three miles. The mines are situated between Garfield and Soda Springs, and about 30 miles east from Hawthorne. The best prospect in the district at present is being worked by Ed. Brown. The shaft is about fifteen feet deep and the ledge in the bottom is nearly five feet wide. The whole ledge will pay \$30 per ton, but it can be sorted so as to go to \$100. Wood and water are convenient, and if the ore goes down Silver Star will be a great camp.

White Pine District.

SHUT-DOWN AT OSCEOLA.—Word has been received from Osceola, says the *White Pine News*, that Supt. A. J. Millick, of the Osceola Gold & Milling Co., has closed down the mill for the winter, owing to the heavy snow and cold weather. The ores there are plentiful and easy to leach, so that those interested think the camp is going to take on new life in the spring.

ARIZONA.

FINE ORE.—*Moheve Miner*: Some of the finest ore in White Hills camp has been struck in the bottom of the shaft in the G. A. R. mine. The shaft is now down over 400 feet and a large body of water has been encountered. The pump handles this volume of water very easily, and there is no delay in sinking from this source. A. M. McDaniel has given a lease and bond on the Tennessee mine, at Chinle, to Walter S. Hadley of Albuquerque. Mr. Hadley will immediately commence work on the property and open it up in good shape. If the ore body develops well, a concentrating plant will be erected near the mine and the ore reduced as much as possible. The property is a good one, carrying a very high grade of galena with gold and silver in paying quantities.

A strong effort is being made to put up a high mill in the vicinity of Stockton Hill by Eastern parties. The development of that part of Mohave county is earnestly to be desired, because it has some of the richest mines ever found in the county. A tunnel under the hill would open up hundreds of veins, the wealth of which is incalculable.

NEW MEXICO.

NEW MINING CAMP.—A new gold field in the Black Mountain spur of the Organ range of southwestern New Mexico is attracting considerable attention. Prospectors and old timers are flocking to the scene from various parts of the country, some of them in mule teams and some afoot. Twelve and a half square miles of claims have been located, and the samples of ore promise a bright future for the camp, which is located near the Mormon mine. A small town will soon be established, and, as soon as capital becomes interested, things are expected to hum.

OREGON.

A GOON PROSPECT.—*Baker City Democrat*, Jan. 22: Three hundred and twenty-seven ounces—that is the weight of a gold retort brought in from the White Swan yesterday. After another run of six days at the White Swan, Supt. Niven is again to the front with a fine cleanup, the value of which being \$6000.

OPERATIONS RESUMED.—*Baker City Democrat*, Jan. 22: After a month's suspension on account of the replacing of the old boilers by new ones, the Virtue mine resumed operations yesterday with a large force in every department, and under more favorable auspices than ever, and it can be safely stated that the monthly outputs will be larger than ever.

BUILDING A ROAD.—*Jacksonville Times*: The Golden Eagle Mining Co. have a force of men at work building a road to their mines in Williams Creek district, in order to haul the ore to the mill, which is two miles distant. There are 75 tons of quartz on the dump, to be milled when the weather settles, and they have a prospect shaft down 80 feet.

G. W. Tremain, of Wolf Creek, has sold two stamps of the Star mill to M. E. Clark & Son of Leland, who shipped them to Gold Hill, where they will be placed in operation.

J. Garvin has commenced work on one of his quartz locations on Wagner creek, having disposed of his sixth interest in the Golden Eagle mine, on Williams creek, to Pelton & Neil.

Owing to the bad roads, the Ashland Mining Co. only made a 12-day run last month. The new tunnel will be completed in about two months, as the Burleigh drill is doing good work.

Hull & Beck, who have rich placer diggings on Louse creek, a few miles from Grant's Pass, have found one of the ledges which feed their mine. They sacked eight sacks of ore for shipment the other day, which are valued at several hundred dollars per sack.

Coast Industrial Notes.

—San Diego talks of a new \$1,000,000 hotel.

—A Fairhaven, Wash., man shipped 1000 pounds of smelt by express to Dakota and Montana points last week.

—The committee having charge of the unemployed at Riverside has decided to reduce the pay of married men from \$1.25 to \$1.

—The owner of the United Verde copper mines in Yavapai county, A. T., is to build a railroad to connect with the Santa Fe, a distance of twenty-eight miles.

—Spokane, Wash., is elated over the prospect that the Great Northern Railroad Company will build a large steel bridge over the Spokane river, near that city.

—The Southern Pacific has notified the Santa Fe that it will refuse to interchange passenger business via Los Angeles after February 23. Trouble will probably result.

—A rumor of good authority is around South Riverside, to the effect that the tin mine company will soon put on a small force of men to sink the present shaft deeper.

—Mason county, Wash., cut more than one-third of the logs put into Puget Sound or its tributaries in 1893. The total product of the country was 101,920,770 feet, valued at \$560,564.

—A movement is on foot in Seattle to organize a company to cure fish. Cod and halibut abound in northern waters, and enterprising business men see in this scheme big money.

—Water has been turned into the mains of Vallejo's new water system, which cost \$250,000 and is owned by the town. Everything worked satisfactorily. A big celebration is planned for some day this week.

List of U. S. Patents for Pacific-Coast Inventors.

Reported by Dewey & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR THE WEEK ENDING JAN. 23, 1894.

513,228.—CAR BRAKE—S. V. Bahne, Ellensburg, Wash.

513,300.—GAS-LIGHTER—W. L. Brown, S. F.

513,059.—THRESHING MACHINE—S. D. Crockett, Seattle, Wash.

513,232.—ROTARY ENGINE—Thos. Harding, San Jose, Cal.

513,330.—TRIMMING STEREOTYPE BLOCKS—A. Keyser, Oakland, Cal.

513,124.—BUNK FOR LOGGING TRUCKS—C. D. Matheny, Seattle, Wash.

513,125.—MILE RECEPTACLE—J. M. Mathews, Seattle, Wash.

513,335.—PLOW—F. S. Moore, Hanford, Cal.

513,208.—FRUIT CAR—H. A. Smith, Los Angeles, Cal.

513,216.—CONCENTRATOR BELT—H. J. Summerhayes, S. F.

513,347.—MAGNETO-ELECTRIC MACHINE—H. H. Taylor, Los Angeles, Cal.

513,350.—RHEOSTAT—B. C. Van Emon, S. F.

513,221.—SAUCEPAN—R. B. Vanderburg, Long Beach, Cal.

513,222.—SOLDERING IRON—R. B. Vanderburg, Long Beach, Cal.

NOTE.—Copies of U. S. and Foreign patents furnished by Dewey & Co. in the shortest time possible (by mail for telegraphic order). American and Foreign patents obtained, and general patent business for Pacific Coast inventors transacted with perfect security, at reasonable rates, and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

APPARATUS FOR TRIMMING STEREOTYPE BLOCKS. Albert Keyser, Oakland, Cal. No. 513,330. Dated Jan. 23, 1894. This invention relates to a device for trimming stereotype blocks. Its object is to hold the block in place so that it can be trimmed into an exactly rectangular form to fit wherever it is to be used. It consists of a frame or stock with longitudinal bed or channel provided with side walls and a holder for the trimming file with guides upon which it travels so that it can be moved back and forth upon the frame and above the block

which is to be trimmed. The height of the movable trimmer is constant and at a point which will trim the block so that it will be exactly type high. The sides and edges are trimmed by fixing the block within the proper holder and turning the file-carrier upon edge. It has a tongue formed upon this edge which travels in a rabbet or groove in the holder, which thus carries it in exact line as it is reciprocated, and the block is thus trimmed off to any required degree and with accuracy.

ELECTRIC GAS-LIGHTER.—W. L. Brown, San Francisco. No. 513,300. Dated Jan. 23, 1894. This invention relates to that class of electric gas-lighters in which electrical contact is made and broken between the electrodes in the vicinity of the gas-burner, whereby the electric spark produced will light the gas. The object of the invention is to provide a simple, effective and easily operated gas-lighting device, which is dependent upon and is simultaneous with the operation of the ordinary gas-cock key, so that no instruction need be given in the manner of lighting the gas. A cam is fixed upon the key which opens the gas passage. When the key is turned off the pin or stud of the electrode arms lies in front of the cam passages at the point of the tongue. When the key is turned to allow the gas to pass, the eccentric or cam moving the pin or stud raises the latter, lifts the arms so as to bring them into electrical contact just before the key reaches its full open position, and this contact is broken by a little further movement of the key so as to produce a spark by the separation of the points.

AUTOMATIC RHEOSTAT.—B. C. Van Emon, San Francisco. No. 513,350. Dated Jan. 23, 1894. This invention relates to rheostats for varying the resistance of electric currents by means of a step-by-step change to either reduce or increase the length of the circuit. It is more especially intended to be used in the armature circuit of a constant potential motor for the purpose of starting and stopping the motor in the proper manner. I employ a rheostat having a switch of a sufficient number of points of contact so that an electrically connected lever will sweep across these points to either withdraw or induce the parts or divisions of the

rheostat according to requirements. In my invention, the lever is automatically operated whenever started by any external means, and it then slowly cuts out the resistance from the circuit or rapidly introduces it, as the case may require, without further external aid. The mechanical and automatic devices are operated in various ways, depending upon the service the motor is performing, such as the operation of a pump by which water is raised from a lower to a higher receiver or forced into a pressure receiver, in which case a cock or valve is opened at the proper time to admit water into a cylinder so as to actuate a piston which is connected with the rheostat lever.

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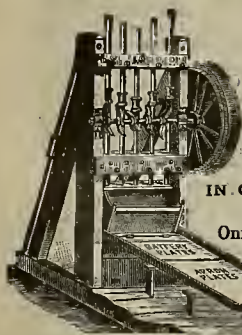
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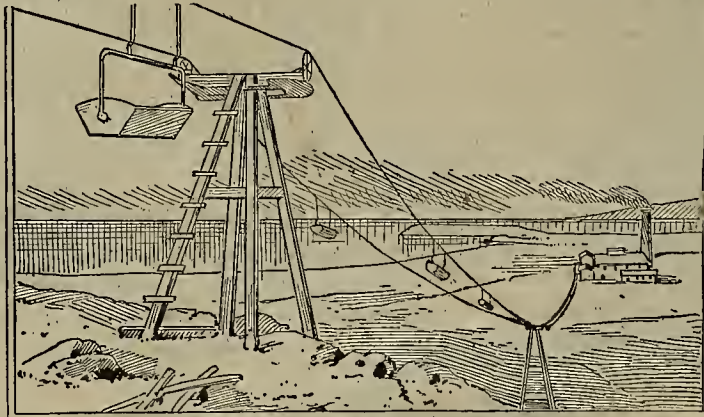
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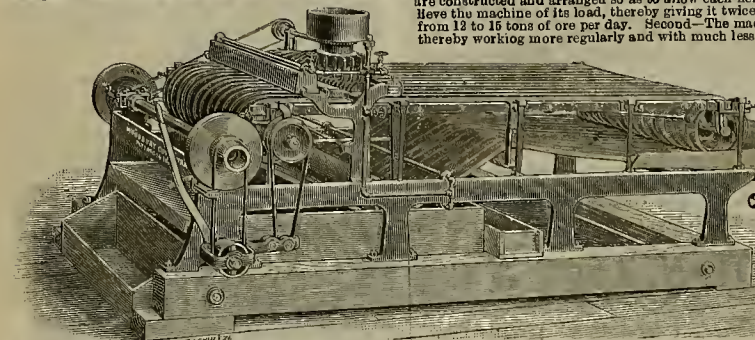
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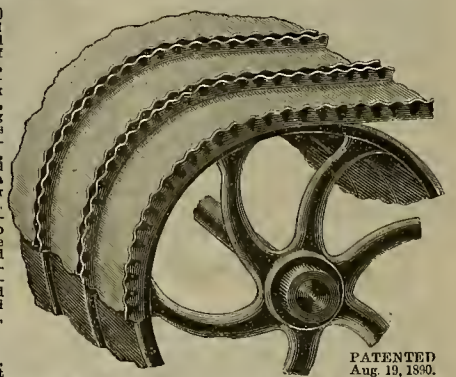
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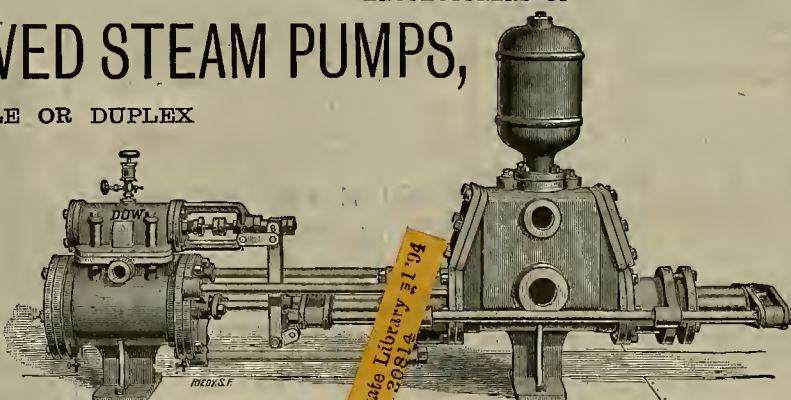
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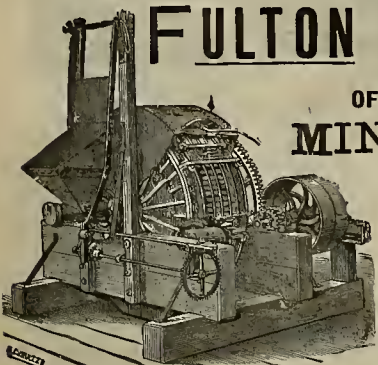
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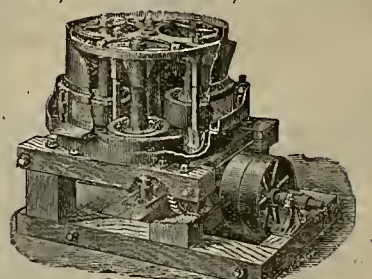
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VOLUME LXVIII
Number 6.

SAN FRANCISCO, SATURDAY, FEBRUARY 10, 1894.

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Electricity in Montana Copper Mines.

It is announced in Butte that electricity is to be used extensively in connection with the development of the copper properties owned by W. A. Clark. The Rothschild brothers are said to have become interested with Mr. Clark, and to have dispatched to the ground a representative of a large English manufactory of electrical machinery.

It is said that the plans contemplate the purchase of five electric hoists, nine electric pumps, both for station and sinking purposes, and electric drills. In fact, steam power will not be used around the mines for any purpose. A mammoth smelter will be erected near the site of the Butte Reduction Works, and this will also be operated by electric motors, and the electrolytic process of treating the ore will be adopted. To furnish the current for the mines and smelter the company will install its own dynamos to furnish the motive power.

Electric cars will convey the ore from the mines to the smelters, and the handling of the ores by elevators will also be accomplished by the use of electricity.

It is understood that another proposition was discussed by the company, viz: The erection of the smelter at the Big Hole river, but this scheme was abandoned in the belief that better results could be obtained from the use of the electric fluid.

If Congress adopts the recommendation of the House committee, the appropriation for rivers and harbors will aggregate \$8,300,000, against \$14,166,153 in 1893. It is obvious, therefore, that it will be difficult for any particular section to secure a large appropriation, and there is danger that California will be shut off with a very small loaf. Indeed, Congressman Caminetti has already declared against any appropriation for Oakland harbor and Petaluma creek, and there is a very pretty row over his stand, which is of course in the interest of the Sacramento river and tributaries. The delegation from California now



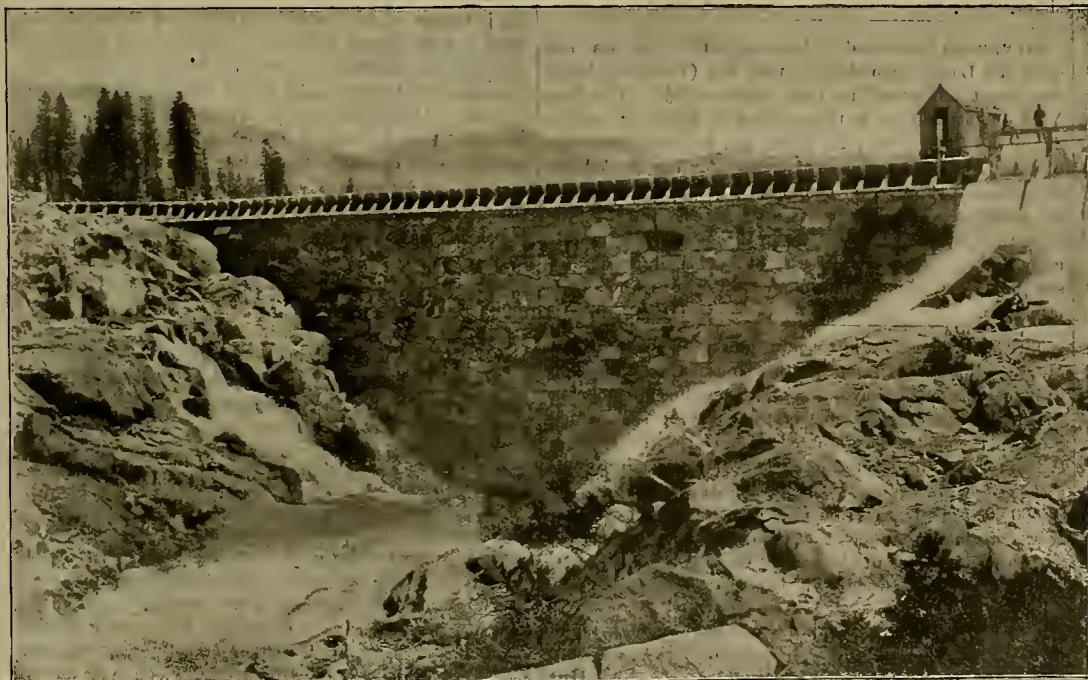
FORDYCE LAKE AND DAM—See page 85.

in Washington may not seem to have accomplished much, but very probably it has been instrumental in saving the item for this State from complete emasculation. The miners' delegation ought to be able to do as much for the restraining dams.

THERE are signs of renewed agitation of the silver question, for some months displaced by the discussion of the tariff. A meeting of prominent citizens has just been

held in Boston to promote the establishment of international bimetalism, and a representative committee was selected to push forward the work. President Andrews of Brown University was elected chairman. The promoters are opposed to the free coinage of silver by this country, but believe that the repeal of the purchasing clause of the Sherman act affords an excellent opportunity for advancing the cause of international bimetalism. They think the needs of commerce will soon compel the international use of silver as well as gold. The committee includes merchants, legislators (national and State), professors, lawyers, railroad presidents and trustees of large concerns. In order to further their objects a series of lectures and public discussions will be arranged, and a great quantity of circulars will be distributed broadcast. Congress seems now to be in the humor for some sort of legislation recognizing silver, and so, perhaps, the outlook is not so gloomy as it appeared a few months since.

RUMORS come from the Cœur d'Alene mines that the labor troubles of 20 months ago are about to be renewed. The Italian miners are the cause of dissension. If reports be true, the edict has gone forth that they must be driven from the Cœur d'Alenes. The former conflict was attended by bloodshed and destruction of life and property. The situation is greatly aggravated by the depression that prevails throughout the Cœur d'Alene region. But while this may be a leading cause in fomenting trouble, it is likely to be also an important factor in ending it, for the very simple reason that the miners' union is not as powerful as it was, and the owners would not look upon a season of idleness with grave consternation; that is to say, their position cannot be rendered much worse by a cessation of operations. It is a fact that a majority of the Cœur d'Alene mines are operating without expectation of present profit and because it is desired to afford its employees means of subsistence. The time to strike is therefore not auspicious.



LAKE SPAULDING DAM—See page 85.

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San Francisco, February 10, 1894.

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The long-pending transfer of the Idaho mine, in Grass Valley, to its new (Maryland) ownership was consummated last week. S. P. Dorsey will be the general manager and superintendent and Victor Dorsey will be acting superintendent. Mr. Farnham, who has been shift boss at the mine, will be foreman in place of John Carter, and the latter will be the chief timberman. Thomas Dunkley will still be the chief engineer at the mine, and no further changes for the present are anticipated. Eugene C. Creller, who has long been superintendent, retires with a most creditable record as a successful and intelligent executive. It is expected that the new owners will continue vigorously the work of restoring the hoisting works, recently burned, and that the mine and mill will, within reasonable time, again be in active operation. The transfer of this property consummates a most important mining deal. It is the happy conclusion to vexatious and expensive litigation between the two properties; and it is an assurance that the mine which has been the largest producer in the history of California quartz properties will continue to be a leading factor in our gold production.

The following table of admissions to the World's Fair and Midwinter Fair, respectively, for the first ten days after opening makes a good showing for the latter, taking all the circumstances into consideration:

SAN FRANCISCO.		CHICAGO.	
Jan. 27.....	72,248	May 1.....	187,657
Jan. 28.....	12,312	May 2.....	19,544
Jan. 29.....	8,270	May 3.....	28,607
Jan. 30.....	8,092	May 4.....	24,186
Jan. 31.....	5,823	May 5.....	20,861
Feb. 1.....	7,254	May 6.....	28,860
Feb. 2.....	9,253	May 7.....	36,689
Feb. 3.....	14,908	May 8.....	28,455
Feb. 4.....	13,154	May 9.....	32,153
Feb. 5.....	6,629	May 10.....	26,261
Feb. 6.....	6,629	May 11.....	26,261
Total.....	158,879	Total.....	277,138

The Chicago fair cost twenty times as much as the San Francisco show, and was of course larger in every way; but the attendance is not proportionately larger.

DRIFT MINING has never made much progress in Shasta county, but it is known that the county contains several ancient river beds which would pay well for development. One or two enterprises are already on foot. George Martin, O. E. Nash and County Treasurer Jackson are driving a tunnel into a hill near Redding, on the east side of the Sacramento, with confidence that they will find an old channel. The tunnel is now very nearly through rimrock. The late Erastus Parsons, before his death, proved the existence of a pre-historic gravel deposit under the sandstone capping on Oregon gulch by sinking an 80-foot shaft through the sandstone and into gravel that carries gold. Everything indicates that this is an old river channel, and that the gravel carries gold is a settled fact. The Redding Democrat rightly considers the present work a most important enterprise.

Carson River Mining.

It is announced that the Carson River Dredge Company, which appears to be the successor of other organizations which have attempted to work the tailings of the Comstock mines deposited in the Carson river, has at last devised a method by which the material is successfully handled, and it is proposed to go ahead and put in an extensive plant as an adjunct to the clam-shell scoop dredge, and operate on a large scale. The process, in brief, is the utilization of Woodbury concentrators for the extraction of sulphurets, quicksilver and free gold from the tailings, the seven-belt end-shake concentrators appearing to possess peculiar fitness for this sort of work. The tailings are raised from the bottom of the river by means of the scoop, and deposited on a grizzly; the finer material then passes to a revolving screen, where it is prepared for the concentrators. The entire outfit is located on scows anchored in the river.

The recent experiments of the company have been conducted with two concentrators, and it is stated that an average of about \$9 per ton has been realized, at an average expense for handling of about 50 cents per ton. The dredge has a capacity of about 500 tons per day, and each concentrator of about 15 tons per day of 24 hours. It is now proposed to put in 20 concentrators, which will have an aggregate capacity of 300 tons per day. If operations are as successful as are now confidently expected, the profits will be very large, and the plant may be still further increased.

The Carson river has for many years offered an exceedingly inviting field for river mining operations. The various mills along the river have deposited during many years an immense quantity of tailings, aggregating an incredible number of tons. The deposit in places is 25 and more feet deep, and covers the entire bed of the river for many miles. The statement is frequently made that 20 per cent of the entire hulsion output of the Comstock lies in the bottom of the Carson river, but it is probably an exaggeration. It can hardly be expected that more than a small part of the great value of gold, silver and quicksilver known to be there can ever be recovered by any process, no matter how efficient. For many years many methods have been devised for working the tailings, and a great deal of money spent in experimentation. An extensive amalgamation plant was put in by a Philadelphia concern; but, after running some months, a cleanup was made, and little or nothing realized. A project for electric reduction was launched, and many thousand dollars invested, but it likewise proved a disappointment. But the scheme was so attractive, and was so certain to prove very remunerative, if ever the right method was secured, that speculators persisted, and still persist. It is to be hoped that the latest venture will be a success. It certainly promises much.

The Carson River Dredge Company owns 15 miles of the river bed, and therefore has abundant territory for very large operations. It is said to have made an investment of \$100,000 in its mining outfit alone. It has been conducting its concentration experiments for several months, with uniform success, so it is stated. The material recovered is mostly concentrates—about four-fifths—and one fifth free gold, besides a quantity of quicksilver.

SILVER has been steadily declining during the past ten days, the London quotation of this day (Thursday) being the lowest on record in that market—29½d. The New York quotation is not at this writing at hand; but yesterday it was 64½c, or only 2½c above the bed-rock quotation of June, 1893. The causes, of course, for the decline are the excess of supply over demand. The United States is not likely to become a purchaser for coinage purposes for some time, and the use of silver in this country is practically limited to the arts. It is, of course, impossible to say how long this deplorable condition of things will last.

THE silver question has again presented itself to the House. Bland, chairman of the House Committee on Coinage, has made a favorable report on the bill to coin the silver seigniorage in the treasury. At the same time, Stone of Pennsylvania presented an adverse report from the minority of the committee. The Bland proposition is advanced with a view of supplying the treasury with \$56,000,000 in silver certificates to meet current expenses. It was originally intended that the coinage of this amount of silver seigniorage would prevent Carlisle issuing bonds. It is probable that the bill will pass.

THE Debris Commission held a meeting Tuesday afternoon in the Flood building. Licenses to work mines were granted to Nathan Gardiner, proprietor of the Red Hill mine at Ono, Shasta county, and to the Fifty-four Flat Mining Company of Amador county.

A New Rotary Mill.

Mr. William A. Merralls, M. E., of this city, has received a patent on an ore-crushing mill which presents some features that are a variation of and are claimed to be an improvement on stamp and other mills. The essential principle is the Chilian type of mill. The invention, as described, consists of certain novel features of construction, a novel combination and sub-combination and arrangement of parts, rotary wheels, hinged boxes for the shaft of the wheels to run in, a cylinder within the pan or chamber, and provided with a piston working up and down in the cylinder and operated by either water, air or steam; halls, collar bearing, bearing halls running in a lubricant; a spider, suitable springs, pipe connections to a cylinder, relief valve, a pump and pressure tank for holding water or air under pressure. Conspicuous features of the invention are an attachment of the air, steam and water cylinder, so arranged as to exert a direct pressure of 25 tons upon the rollers; an arrangement of screens to prevent slimes; and an easy device for the elevation of the rollers when any obstruction occurs in the pans, or when temporary repairs are necessary, or for any other purpose, without unloading the mill; and such solid and compact construction that undue jarring and straining are avoided.

Mr. Merralls furnishes the PRESS with the following statement of his claims of the new mill's points of superiority over stamp mills:

1. The mill makes very little, if any, slimes.
2. The mill is a better gold amalgamator and will save from 10 to 50 per cent more gold in the ore than is possible with stamps.
3. The amalgamation in the Merralls mill is done in the inside around the cone, out of the way of the crushing rolls, consequently there is very little, if any, flouring of the quicksilver.
4. The wear and tear of the Merralls mill is not over 4 or 5 cents per ton.
5. There are no expensive foundations to be put in, and if it should be desired to move the mill at any time, it can be done at a small expense.
6. The power will only be about two-thirds of the power required to drive a 10-stamp mill.
7. A six-foot mill will crush as much ore as 15 stamps will do, with same size mesh screen.
8. The ore as crushed will concentrate much better than the pulp from a stamp-mill, because the pulp is more uniform and granular.
9. No oil can get into the circular chamber to interfere with amalgamation.
10. The dies and rings wear smooth and even, and not in holes or flat surfaces.
11. The power can be put on or off the crushing wheels instantly.

Mr. Merralls is making arrangements to manufacture his mills in San Francisco.

The New Tariff Bill.

The Wilson tariff bill, as it passed the House, contained several features most odious to the mining interests of the West. These have already been pointed out in the PRESS. It now seems likely that the bill will pass the Senate and become a law, notwithstanding the fact that the judgment of the country, as indicated in recent elections, is most clearly against it. The measure is weighted down with an income-tax provision, and there is some talk of an effort to further load it with a free-silver amendment, in hope of alienating enough friends to defeat the final passage. It is doubtful if this latter proposition will succeed, however desirable free silver may be, and however earnest and aggressive are its friends. The vote on the bill in the House was pretty closely on party lines. Tremendous pressure will be brought to bear on the Senate, so that, if no emergency arises, it may reasonably be expected that similar conditions will prevail and similar action be taken there.

Still, the victory of the tariff-reformers is by no means won. The bill will not be law until it has passed the Senate and is signed by the President. There is ample opportunity yet for the setting of legislative traps into which the bill may fall. It cannot be doubted that the opponents of the measure will exhaust every parliamentary device to secure its defeat. A protracted struggle is to be looked for.

THE official report of the production and coinage of gold and silver in Mexico during the fiscal year 1893 is out. It shows the production of \$1,400,000 gold and \$48,500,000 silver. In the face of the depreciation of silver, this is the largest year's production in both metals Mexico has known in many years. The mintage for the year was \$361,672 gold and \$27,160,876 silver. The low amount of gold coined arises from the fact that the monetary system of Mexico is now operated practically on a silver basis.

Needed Changes in Mining Methods.

By W. S. Chapman.

An entire change in the management of mines is essential to the development of the great interest of mining in California. It has been the almost invariable custom to build a mill before one had a mine. The whole country is dotted with useless mills where no mines exist. When the writer came to the State of Nevada, in 1864, he found quartz mills, having cost from \$50,000 to \$250,000, all over the State, and the rule was that there were no mines. In Amador county, in this State, it is safe to say that only four mines have been systematically opened and developed. The first thing to do is to sink a shaft, deep enough to prospect the mine thoroughly, so as to know whether you really have a mine or not. The shaft should be sunk, ordinarily, to 1000 or 1500 feet, levels opened at each 100-foot station, the veins crosscut at each level, and when that work has been done, the miner will know whether he wants a 20-stamp mill, a 40-stamp mill, or a 100-stamp mill, or any mill at all.

Four mines only have been systematically opened in Amador county, where there are more than 100 now known to exist that have never been opened; but attempts at prospecting have been made upon all of them. The four mines I speak of are the Hayward mine at Plymouth, the Zeily and Kennedy at Jackson, and the Keystone at Amador. In every one of these instances the mines have been partially worked and abandoned, but when taken hold of by capital and developed in a business-like way, they have all paid very largely. The Zeily is a very low-grade proposition, running only about \$3 to \$3.50 per ton, sulphurets and all, but by the systematic management of Mr. Dutard, it has been judiciously developed and has paid dividends every year. But for the sulphurets which he carefully saves, his mine would not pay more than running expenses.

In Tuolumne county I know of a large and very valuable mine which only pays 50 cents a ton in free gold, but by the careful saving of the sulphurets and "slums" it pays regularly from \$20 to \$22 per ton. This mine, after running the pulp over the concentrators, then onto large canvas floors and then into a system of settling tanks, thus saves the sulphurets to almost the smallest percentage. In this way the mine, although abandoned by various companies years ago, has proved to be a very good paying property and is very extensive and valuable.

Even the Comstock, when I came to Nevada in 1864, allowed the "slums" to run down the ravines and gulches into Carson river. That river has carried millions of tons to the sink of the Carson. Now these tailings have been found so valuable, after passing so far through the gulches and ravines, that mills have been erected at the sink to work them over again. By the present manipulation of the same class of ores, after the experience that those men have had, and after years of study and attention to the business, those tailings are not allowed to escape until nearly all their value has been extracted. It is estimated that in the working of the Comstock from 20 to 40 per cent of the value of the ores of early times went down the gulches into the Carson river. The difference we now find is the result of thirty years of constant experience, study and attention.

The same rule would apply to the gold mines of California. In the early days such a thing as concentrators were unknown. No sulphurets were saved at all. Even the great Idaho mine at Grass Valley in this State, from which has been extracted \$13,000,000 gold, was worked many years without even having a concentrator of any kind. Now it is found that millions of dollars were run down the gulches with the tailings, which with present appliances and present experience could have been saved, over and above what was realized.

Mines must be more economically worked than they have been. There is no reason why wages should remain as high as they are. While I am not in favor of reducing workingmen's wages as a rule, yet I think it would be far better for the unemployed to work in the mines for \$2 a day than to be seeking work in the park or around the city, or any place where they may procure work at a dollar a day, and most of the time having nothing to do at all.

In the copper mines near Lake Superior, where all our miners might receive many very valuable lessons, mines are worked to great profit where if in California they would not pay the board of the miners. Now, why is this? California has a better climate, both in summer and winter, and is the *cheapest place in the world to live*. Nearly all the gold mines of California are situated in the pleasantest climate in the world, where fruits and garden stuff can be raised almost for the planting, where schools and all the advantages of civilization can be had, and yet men will work on a farm through the heat of summer and the inclemency of the winter for \$20 to \$25 per month, and

the same men going into a mine, where it is dry in winter and cool and pleasant in the summer, must have from \$2.50 to \$3 per day, or else they will go to the city and beg for an occasional day's work to get money to sustain life.

In one of the important copper mines near Lake Superior, from which they are now hoisting ore from 1700 feet below the surface, shipping it three and a half miles to the furnace, the ore is very hard and difficult to crush, and pays but three-fourths of one per cent in copper. The copper is worth eight cents per pound, and when saved by the most careful manipulation is worth only \$1.20 per ton, and yet that mine has paid hundreds of thousands of dollars in dividends. The development of the Oripple Creek mines of Colorado and the recent purchase by Senator Jones and Mr. Haggin of a very extensive mine in another part of Colorado shows that all over the country those demonetized silver miners are prospecting for gold, and many of them with great success. All those miners, instead of going to the cities, where work is never abundant and where wages are always low, would better have gone to the gulches, with pick, pan and shovel. There is scarcely a gulch in the Sierras that would not pay more than the unemployed in San Francisco get at the park.

Mining Is Not a Gamble.—Mining has heretofore been called gambling. I denounce the expression as inapplicable to any such legitimate business as mining. It is unfortunate that when the miner, without money, goes into the mountains, camps out and lives in a rough manner, finds his mine, and, when he has developed it sufficiently to know that he has a mine, and wants machinery and a mill, and goes to the city, the capitalist—who ought to stand in with him and help him to develop the mine—will not assist him in any way, as a rule. But the time has come when this sort of thing should and will change. It is now apparent that no business in this State, or in any of the gold-producing States, is considered so safe or so profitable as mining. And the time will come very soon when mining will not be called gambling, but when the miner will have as good credit as the fruit-grower, the wheat-producer, the cattle-raiser or men engaged in any of the other ordinary occupations of life. The gold product of California for 1894 will be about \$20,000,000. Shut down all the mines, and take off that supply of gold, and then indeed we can talk about "hard times;" but as long as we produce that amount of money—and that amount increasing annually—we will never see hard times, such as the Middle, Northern and I may say Eastern States now suffer. There can be no reason why California cannot work mines a little cheaper than Michigan or any of the Eastern States. Coal mining in Pennsylvania does not cost 40 per cent of our present cost of mining in this country, and yet all supplies needed by the miner can be bought as cheap, and many of them very much cheaper here than in Pennsylvania, Illinois or any of the coal-mining States.

People generally have very little knowledge of the mines of California. Many old Californians think that gold mining is about finished in California; that there is very little gold left in the mountains, when in fact the mountains have not been prospected. And when we look over the single county of Amador, through which the mother lode passes almost without a break, and find that but four mines in that county have been developed to any considerable extent, it is not difficult to see that the scarcity of mines is due to the want of vigor and enterprise to develop them.

W. S. CHAPMAN.

Slitkens.

THE Puget Sound Reduction Co. has completed their plant at Everett, Washington.

SPOKANE is making an effort to secure the next meeting of the Trans-Mississippi Congress.

ANOTHER expedition is being fitted out at Vancouver, B. C., to search for supposed hidden treasure in Cocos island.

THE Alta Gold Mining Company has incorporated; directors, W. M. Hall, W. S. Miller, F. S. Chadbourne, J. P. Edhoff and J. E. Doolittle.

A STAMP MILL was completed in Kennedy district, Humboldt county, Nevada, last week, and the event was celebrated with fitting ceremonies.

THE directors of the Morning Star mine, situated at Iowa Hill, have declared a dividend of \$4 per share. The mine is in a splendid condition.

MINING assessments falling delinquent in February amount to \$150,300, of which Nevada mines want \$131,300 and California mines \$19,000.

COLONEL W. J. SUTHERLAND of the Candelaria companies has given up his proposed trip to Central Africa, and will again visit this coast next March.

J. V. KAELEY of Pioche, Nev., who has been in New York for some time past, is reported to have sold the Clementina gold claim in Yellow Pine district.

THE Granite mine at Wallace, Idaho, one of the largest producing mines in the Comstock district, has shut down, it is said for good. All the men have been paid off.

THE Comstock payroll for the month of January was \$65,214.25, an advance over the previous month of \$4370. As a

number of new explorations will be undertaken this month, the Virginia Chronicle says that the February payrolls will probably show a further increase.

MAARTIN MYERS, a prominent mining man of the Kaslo-Slocan district, is in the city, for the two-fold purpose of attending the Midwinter Fair and investigating the cyanide process.

A CRUSHING of ore from the Osborn Hill mine, Grass Valley, has just been finished at the Rodgers mill in Boston Ravine. The ore averaged about \$30 per ton, not counting the sulphurets.

THOMPSON CAMPBELL of Butte has five sapphires said to have been taken from the gizzard of a Montana turkey. The sapphires are all of good size and one of them weighs about two karats.

"JIM" WADSWORTH, who recently went to South Africa from the Comstock district with fond hopes of recouping his fortunes, is reported to be on his way back, after only a few weeks' stay in Johannesburg.

THE Mercur mine, in Mercur district, Utah, is said to have developed a vein of gold-bearing quartz 14 feet in width showing an average value of from \$8 to \$16 a ton. The mine has been sold to Denver capitalists.

W. B. BUCKMINSTER, representing the California quicksilver mines, is in Washington again and will endeavor to secure a hearing before the Senate finance committee in his attempt to secure the restoration of the duty on quicksilver.

It is claimed that no other town can duplicate the mineral exhibit sent from Lovelock to the Midwinter Fair. It will include the following minerals found near the town: Iron, lead, copper, bismuth, antimony, nickel, cobalt, borax, silver and gold.

THE bill of Senator Dubois of Idaho to give several Western States one-fourth of the money received from them by the Government for mineral lands, to support schools of mines, has been adversely reported by the House Committee on Public Lands.

TAYLOR D. McLEOD, the well-known mining man, has returned to the city from Seattle. His address in San Francisco for some time will be 1007 California street. Mr. McLeod will shortly leave for Arizona, where he has important mining interests.

THE Grass Valley Union has just issued a very creditable Midwinter Fair edition. It contains complete and accurate reviews of the mining and various other resources of Nevada county. Typographically, the number is well arranged and very tasteful.

SUPERINTENDENT HOFER of the United States Mint at Carson has received instructions from Washington to dispense with H. J. Humphreys, weigh clerk; W. R. Raddall, bookkeeper; Ernest Christian, melter; G. A. Spencer, helper; and A. S. George, yardman.

A LARGE portion of the male population of this section are interested in mining in some manner, and many of the rest are following suit, says the Jacksonville Times. Southern Oregon is destined to become one of the great mineral-producing sections of the United States.

THE Silver Convention which was to have been held at Des Moines, Iowa, February 22d and 23d, has been postponed to March 21st and 22d, on account of the first date selected conflicting with a meeting of the Pan-American Bimetallic League at San Francisco and other meetings previously arranged.

MISS EMMA BLACKBURN of Red Bluff is said to be the best female mineralogist in the State. Her life has been spent among mining people and she has picked up a knowledge of minerals possessed by few of her age and sex. She is said also to possess one of the finest cabinets of minerals on the coast.

A SICH STRIKE is reported from the Gold Rock mine, 20 miles from Yuma. From the first the ore has yielded well in free gold. Last week, at the depth of 150 feet, the miners struck a chamber of ore running into the thousands per ton. During the week the body has opened wider and richer. It is considered to be the richest strike ever made in that section.

THE second clean-up at the new cyanide mill at Deadwood shows even better results than the first run, says the Deadwood Times. The following details are given by Secretary Taylor: 42½ tons of ore from the company's property on Black Tail gulch, assaying \$20 per ton, and 11 tons and 800 pounds from the Ajax group on Squaw creek, assay value \$32.35 per ton, were treated. The result was a gold brick weighing 66 ounces, worth \$1168.20, showing an extraction of 91.33 per cent, with a loss of but 1½ pounds of cyanide per ton. The brick contains both the gold and the silver contained in the ore, the former being 907 fine.

COLONEL THOMAS confirms the statement that he has resigned the position of superintendent of the Comstock Tunnel Company. His resignation was forwarded to the directors on January 23rd, to take effect on April 1st. The Colonel has had charge of the Suto tunnel for 14 years. As soon as it became known that he had sent in his resignation the superintendents of Comstock mines and the principal members of the boards of directors telegraphed to New York to the Comstock tunnel directors to refuse to accept the resignation. Included in those who desire the Colonel to continue in the position of superintendent are John W. Mackay and ex-Senator Fair.

Foundry Notes.

FOUR Woodbury concentrators have just been sold in Colorado.

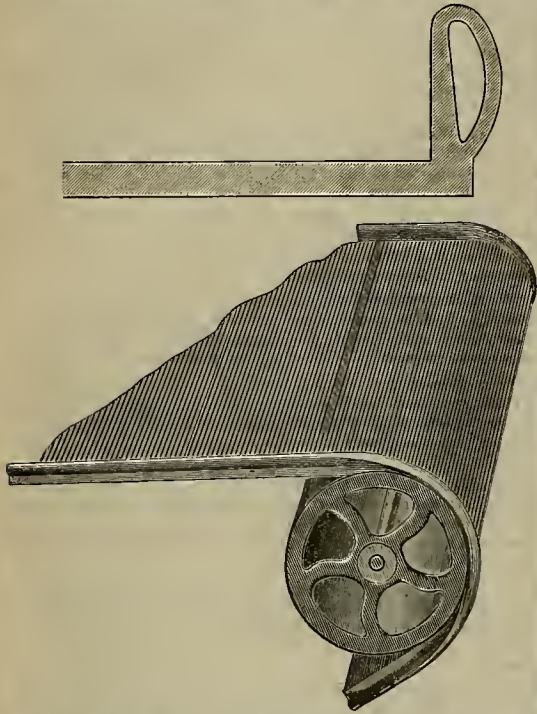
THE Mountain Lion mine in Josephine county, Oregon, has just bought a five-stamp mill and a Woodbury concentrator.

A McGLEW concentrator has just been sent up to the Alentian islands for operation in a mine owned by Louis Sloss, Jr., and others of this city.

THE Salem, Or., Water Company has just filed an order with the Dow Pump Works for the building of a Dow improved vertical triplex pump, to be ready for shipment in 90 days. This new piece of pumping machinery will have a 30-inch stroke and will be 16 inches in diameter. It will have a capacity of 5,000,000 gallons per 24 hours.

Improvement in Concentrator Belts.

One defect in concentrator belts is the liability of the flanges to crack. No matter what the shape of the flange is, there is always a tendency at cracking where there is an edge. With this idea in view, Mr. H. J. Summerhayes has patented a flange without an edge. As will be seen by



the accompanying cuts this flange is hollow, straight on the inside and curved on the outside. The advantages thus gained are: First—As it has no edge, the liability to crack is reduced to a minimum. Second—There is a straight wall on the inside, thus allowing the proper use of water and the keeping of the sand corner under control. Third—Having the most of its weight on the outside, the flange is drawn outward as it passes over the end rolls, thus further diminishing the strain and lessening the possibility of cracking.

A Big Electric Transmission Scheme.

The Clear Lake Electric Company has been organized for the purpose of carrying out one of the largest electrical projects yet announced on the Pacific Coast, or, for that matter, in the United States. For boldness it nearly rivals the scheme to utilize the power of the Niagara falls to transmit electric power for many mills. In short, the company proposes to transmit electrical power from a point on Cache creek, Yolo county, 72 miles to San Francisco.

The amount of capital stock is set at \$5,000,000, and the names of the incorporators are: James Armstrong, president of the Sonora Electric Light Company and vice-president and general manager of the Pacific Electric Storage Company; James H. Culver, secretary of the Mechanics' Institute; Francis X. Simon, manager for Britton & Rey; J. B. Treadwell, the capitalist, and Cameron H. King, the attorney.

The general objects of the corporation are to acquire interests in land and water rights in the counties of Yolo and Lake; to construct dams, reservoirs, canals and other appurtenances for the purpose of using the water acquired by these rights, to supply water for domestic purposes in those counties, and to manufacture and distribute electrical power in various cities, principally San Francisco.

The projector of the company, Ferdinand Formhals, has been for some time engaged in a study of the possibilities of using the overflow from Clear lake, now flowing through Cache creek, for the purpose of operating a plant capable of generating sufficient electricity to supply mills and factories in this city, with the equivalent of 25,000-horse power daily.

The present estimated cost of horse-power in this city, based on the cost of the best Welsh anthracite coal at \$7.50 a ton, almost twice what it costs in the Eastern States, is said to be \$7 a horse-power. About 55,000-horse power are developed daily in this city. A point is made that electric-power can be supplied at less than one-half that of steam-power, besides economy in its use. By the use of separate motors in a factory running many machines, as many or as few can be run as the demands of business may require.

It is proposed to divert the waters of Cache creek at a point near the town of Rumsey in Yolo county, near the end of the Clear Lake and Yaca Valley railroad. From there the power would be conveyed by cables to San Fran-

cisco, a distance in an air line of 72 miles. This plan has been tried in many places. The Drebrum plant, which supplies power between Lauffen and Frankfurt, Germany, it is said, carries the current 108.6 miles.

It is estimated that the cost of supplying 25,000-horse power daily, together with the cost of the necessary land for buildings, the buildings, dams and cable line will be \$750,000. Careful computations have been made of the amount of water daily flowing through Cache creek, with the result that it is estimated that power enough is every day wasted to develop four times as much power as the company proposes to supply.

Another project which will be operated in connection with the establishment of the station at Rumsey is the construction of an electric railroad to Lakeport. The valley of Cache creek affords the only feasible route, but the culverts and bridges required for a steam railroad would be too expensive to make the route profitable. With lighter motive power and lighter cars the road could be constructed at much less cost and be less expensive in operation. With the station established, electricity could be used in the grading operations, still further reducing the cost.

The people of Lake county have offered a bonus of \$50,000 to the first company that builds a road into that county, and the Clear Lake Electric Company will make every effort to secure that bonus.

Mountain Mines---Tuolumne County.

TO THE EDITOR: I send you a description of a few mines situated about three miles from Soulsbyville, Tuolumne county. Some of them are free properties, and can be opened with small capital. They are in the hands of poor men, and they have no money to open them.

First is the Snmmlt mine, which is idle and is a valuable property; two shafts have been sunk on the vein, one to the depth of 80 feet, and there is one ore chute of ore 200 feet in length which has yielded from \$30 to \$100 per ton free gold. The vein averaged about two feet in width. At the water level a good percentage of sulphurets come in, which are of a very high grade. There are other chutes which go from \$10 to \$30 per ton free gold. It is in slate formation, and can be made to pay a good dividend. It is an easy mine to work. A portion of it can be opened by tunnels. There is timber on and near the mine, and good water power, with a fall vertically of about 200 feet with about 600 feet of pipe.

The Champion, near the above mine, is a small vein, but improves in going down. Mill tests give \$16.50 per ton free gold. Water power can be had for this mine.

The Prudhomme mine is also a good property. The vein is in granite formation. Considerable gold has been taken out of this mine. There have been three chutes opened. The first chute is about 90 feet in length and 12 to 15 inches wide; the second is about 60 feet in length and runs up to two feet in width; the third is 30 feet, widening out going down, and is from 1 to 2 feet in width. A portion of ore has been worked down about 75 feet from surface, ore paying from \$16 to \$22 per ton free gold; assay value of sulphurets, \$250 per ton. The Tuolumne Water Co.'s ditch runs by the mine, and there is plenty of timber near the property. It is held by U. S. patent.

The Cordava, owned by the same party as the Prudhomme, is worked from a tunnel. The ore pays well and the vein is of good size. The Tuolumne Water Co.'s ditch also runs by this mine, and it can be prospected with small capital.

MINER.

The Meteor at Candelaria, Nevada.

TO THE EDITOR:—I send a description of the meteor that fell at this place on the night of February 1st. The thermometer registered 15 degrees above zero. At 10 o'clock 7 minutes a brilliant meteor appeared, coming from the southwest. It made a tremendous illumination, suddenly, as if a great flash light was thrown in well-lighted rooms, wherever a corner of window curtain or shade was not tightly drawn. So intense was it in brilliancy that those who were out of doors were dazed, and but few could tell whence it came or whither it went. It was of a dazzling electric blue, like many arc lights had suddenly shot into existence. The illumination lasted about four seconds, disappearing in the northeast. The illumination brought all who were awake to their doors, awe stricken, thinking some slumbering crater had burst into flame.

Thirty seconds later a terrific explosion occurred, like tons of dynamite suddenly exploded, shaking the hills and echoing through the rocky caverns.

It was like a huge bombshell had been hurled in our midst. There followed a boiling and sizzling roar, like an immense mass of red hot iron cooling in water. The sound grew fainter and gradually died away. This lasted about fifteen seconds.

Those who were sleeping and did not see the illumina-

tion were aroused and rushed out of doors, supposing it to be an earthquake or that the crack of doom had come.

When the snow melts and the focus of the explosion is definitely located, a search will be made for the meteorite.

None who saw or heard this meteor will forget it, and they will relate it in future years as a great event; nor will any one here desire to be nearer to those celestial bombs than he was this night. Some ducked their heads to let it go by and considered it a very close shot for a star.

Candelaria, Nev., Feb. 4, 1894. FRED CORKELL.

Mines and Mills of Nevada City District.

From the Midwinter Fair Edition of the Grass Valley Union.

Following is a list of mines, mills and chlorination works of Nevada City district, with stamps and number of men employed:

	Men. Employed.	No. Stamps.
Bellefontaine, quartz.....	8	..
California, quartz.....	6	..
Canada Hill Con., quartz.....	6	..
Cement Hill, gravel.....	4	5
Champion, quartz.....	100	30
Federal Loan, quartz.....	22	10
Floyd & Co., quartz.....	4	..
Gold Flat, quartz.....	15	..
Harmony, gravel.....	40	10
Holmes, quartz.....	4	..
Home, quartz.....	8	..
Knickerbocker, gravel.....	4	..
Manzanita, gravel.....	10	..
Mayflower, quartz.....	5	..
Merrifield, quartz.....	10	..
Mountaineer, quartz.....	45	..
Nevada City, quartz.....	42	20
North Banner, quartz.....	10	10
Odin, gravel.....	15	..
Pittsburg, quartz.....	15	10
Providence, quartz.....	70	40
Reward, quartz.....	10	..
Spanish, quartz.....	35	15
Utah Con., quartz.....	8	..
West Harmony, gravel.....	40	15
Wyoming, quartz.....	10	10
Yosemite, gravel.....	6	..
Totals.....	552	175

In addition to the foregoing, there are many claims where one, two or three men are engaged in prospecting or taking out ore, and of these no account is taken.

IDLE MINES.

Mines with machinery that are now idle, but upon which arrangements are being made to resume work, are as follows:

Banner.....	quartz
Contact.....	quartz
Deadwood.....	quartz
Fountain Head.....	gravel
Montana.....	quartz
Murchie.....	quartz
Nevada County.....	quartz
Sneath & Clay.....	quartz
Texas.....	quartz

CUSTOM MILLS.

	No. stamps.
Locklin.....	5
Nevada County.....	5
Total.....	10

CHLORINATION REDUCTION WORKS.

	Tons capacity per day.
Champion.....	4
Pioneer.....	4
Providence.....	5
Total.....	13

Labor in Grass Valley Mines.

From the Midwinter Fair Number of the Grass Valley Union.

Investigation shows the number of men employed to be as follows:

*Maryland.....	175
North Star.....	175
Empire.....	160
Omaha.....	130
W. Y. O. D.....	70
Osborne Hill.....	33
Orleans.....	32
Electric.....	14
Granite Hill.....	18
Slate Ledge.....	16
Central North Star.....	15
Brunswick.....	15
Hudson Bay.....	12
Centennial.....	10
Pennsylvania.....	10
Wisconsin.....	8
St. John.....	8
South Idaho.....	6
Small mines, about.....	150
Total.....	1057

*Now idle on account of burning of hoisting works.

The wages paid to each man employed will average at least \$2.50 per day. This is a conservative estimate, for nearly all the miners in the district receive \$3 per day, and "top" hands \$3.50 to \$5 per day. From this statement the following deductions may be drawn: Ten hundred and fifty-seven men employed at \$2.50 per day means that \$2642.50 go into the homes of miners in this district every day. Allowing 26 working days a month the amount would foot up nearly \$70,000. For the year the sum would aggregate nearly \$840,000.

In Grass Valley district there are about 250 stamps working in the mills.

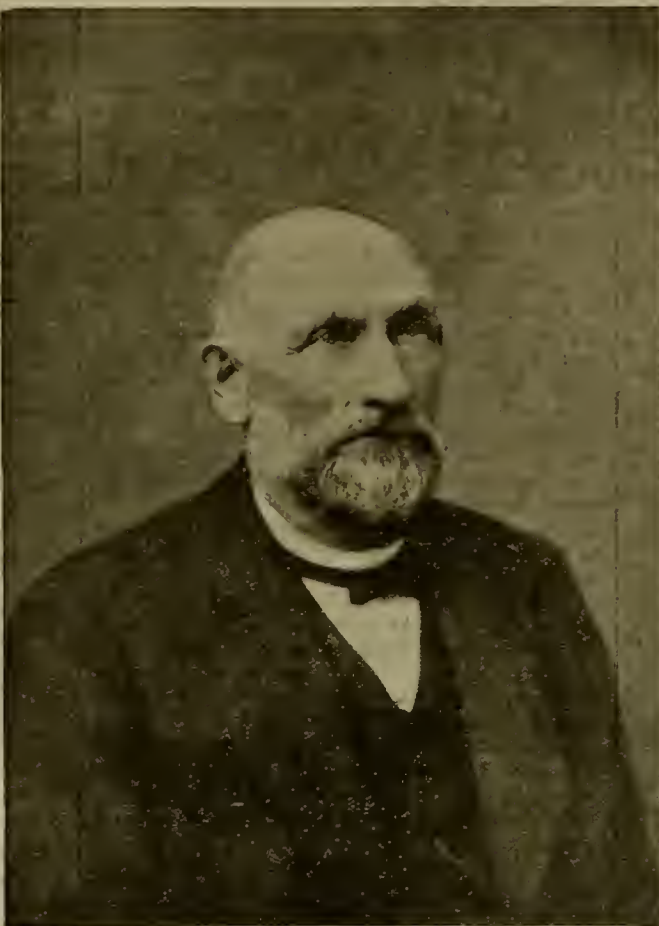
The South Yuba Water Company.

The indispensable factor in the development of the great hydraulic mining interest of California, in years gone by, was the presence of a cheap, abundant and regular supply of water, and the necessity is scarcely less imperative in the operation of quartz mines. The enormous dimensions which hydraulic mining at one time assured were possible only because vast supplies of water were carried to the scene of operations by ditches, flumes and tunnels, often elaborate and expensive, and constructed with the highest degree of engineering skill. To insure a continuous flow, winter and summer, natural lakes high in the mountains were turned into great reservoirs by the construction of dams, often at large expense, and the water which accumulated during the winter and spring was thus stored for use during the summer and fall. The companies which undertook to perform this service for the hydraulic and quartz mines played a most important part in the development of the mining industry of California. Their investments were enormous and their incomes generally commensurate with the hazard and dimensions of their ventures. When hydraulic mining ceased, they were all terribly crippled; some became bankrupt, and few have fully recovered from the blow.

In Nevada county particularly the water companies reached the highest degree of usefulness. They became rich and powerful corporations. They furnished all the hydraulic mines and nine-tenths of the quartz mines with water. Since the former have practically ceased their operations, almost the only company conducting a general business in Nevada and Placer counties is the South Yuba Water Company. It bears such an intimate relation to mining operations in these counties that no review of the history of the industry is complete without mention of its achievements.

The South Yuba Water Company is at once a growth and a consolidation, being largely an absorption of less successful and less fortunate rivals. To the original property of the South Yuba Company have been added the property of the Nevada Hydraulic Mining Company (1880), the Bear River Canal Company (1890), the Fall Creek Water Company (1891), and the lakes of the Omega Company (1893). For forty-four years the business of the company has grown from an unpretentious beginning to a corporation having practical control of the watershed and profitable outlets of the entire region. It is almost the sole source of power supply for all the quartz mines of Nevada and Placer counties, the only exceptions being the new mines and mills operated by steam. It furnishes irrigating water for the important Newcastle fruit district. The municipal supply of Nevada City, Grass Valley, Colfax, Auburn, Newcastle, Penryn, Loomis and Lincoln come from the South Yuba. The electric light plants and other public and private works secure their power from the same source. It is within the possibilities that this company will some day provide water for Sacramento and even San Francisco. In Auburn and Newcastle the waterworks are owned by the company outright; in Lincoln there is only a half-interest; in Nevada City and Grass Valley local corporations own and run the system, purchasing of the South Yuba Company. The storage supply of the company is vast. The reservoirs are simply natural basins in the mountains, shut in by costly dams and so converted into lakes. These storage reservoirs are 18 in number and of great size and capacity. The company's watershed has an area of 170 square miles, and lies about the sources of the South Yuba, just beneath the crest of the Sierra Nevadas, in a very wild and almost

inaccessible region. The annual rainfall averages upward of 65 inches. Snow usually comes down in the months of November, December, January, February and March, and at the close of the stormy season it lies from 10 to 20 feet deep on a level. August is far advanced when it is all melted. The entire available water supply of the watershed is probably not less than 200,000,000,000 gallons and



JOHN SPAULDING, SUPERINTENDENT SOUTH YUBA WATER CO.

is ample for all future needs of the company, on the most ambitious estimates. The vastness of the entire storage system will appear from the following table of area, capacity and cost:



FORDYCE LAKE.

Name of Reservoir.	Elevation.	Area in Acres.	Capacity in Gallons.	Cost of Dam.
Meadow.....	7,515 Feet.	300	1,275,000,000	\$ 75,000
Stirling.....	7,200 "	100	340,000,000	20,000
White Rock.....	7,000 "	80	255,000,000	5,000
Peak Lakes, Three.....	6,900 "	150	1,275,000,000	*
Fordyce.....	6,500 "	474	5,950,000,000	300,000
Lost River.....	7,000 "	*	85,000,000	*
Fall Creek Lakes, Six.....	7,000 "	171	1,020,000,000	*
Spaulding.....	4,846 "	215	2,125,000,000	50,000
Omega Lakes, Three.....	5,000 "	.....	85,000,000	15,000

* Records lost.

The entire capacity of all these 18 storage basins is thus 12,410,000,000 gallons.

At the center of the system lies the most important of all—Fordyce, an expanse of 474 acres. It is situated on the north fork of the South Yuba, 16 miles above the head of the Main canal and 7 miles from Cisco, a station of the Central Pacific railroad, and 6500 feet above the sea. The dam, built in 1873 in a gorge at the outlet of the Fordyce valley, was subsequently enlarged and perfected; it is 815 feet long, 72 feet high on the inside and 90 feet on the outside, and in breadth 125 feet at the base. It is constructed of dry rock wall, lined on the inside with three-inch plank; it has a waste weir 100 feet long and 5 feet deep.

The Lake Spaulding dam, on the head of the Main canal, South Yuba river, is a dry rock dam, faced with plank. The dam is 290 feet long, 67 feet high and 67 feet deep, and the outlet is through a solid point of rock, with two waste weirs each 120 feet long. The area is 215 acres and the capacity over 2,000,000,000 gallons. Lake Spaulding forms a collecting and distributing basin for the entire watershed, and through it flow all the waters of the upper storage reservoirs. It serves to check the admission of snow into the Main canal in winter, and also to regulate the amount of supply for the canal system.

Large as the company's storage at present is, it quite fails to husband the entire supply of the watershed. It is calculated that in an average season Meadow could be filled twice, Stirling five times, Fordyce four times, and so on. During a very stormy year, Fordyce could be filled twelve times. The extreme limit of the supply through present outlets is not less than 150 billions of gallons, or twelve times the present storage. The average supply is fully four times the present storage.

Hence the purchase of reservoir sites to meet prospective demand upon the company's resources—500 acres in Summit valley on the very crest of the Sierra, where an escape gorge offers site for a large and effective dam, 160 acres near Tamarack station on the C. P., at the outlet of a deep, broad, natural basin, and 1000 acres of Bear valley, four miles below Lake Spaulding and at the head of Bear river.

The distributing canals form a network over Nevada and Placer counties and measure nearly 400 miles of distance. The dividing lines are carried along the crests of ridges and are thus available for use for power, for irrigation or for municipal supply, out of reach of local contamination and always exposed to aeration by the mountain breezes. The water that traverses them moves down swiftly, often in rushing waves and not seldom in foam, never for a moment stagnant, and is (excepting that taken from Bear river) soft, clear and cold.

The Main canal heads on a narrow rocky gorge, three quarters of a mile west of Lake Spaulding, and receives its supply through a small tunnel, into which the water is diverted by a log dam. From the tunnel an immense wooden flume, of 136 million gallons daily capacity, is carried along the gorge against the face of a perpendicular cliff, on a rocky shelf blasted out for the purpose. Thence onward for six miles, hugging the wall of the ravine and the wooded slope of Bear valley, the flume conveys its chafing torrent, to empty into a

deep, broad canal, which latter passes through a tunnel, and finally pierces a mountain. The Main canal penetrates a mile of tunneling in all, and it is said to have cost the adventurous miners who built it \$600,000.

Where water is required for municipal supply for power, reservoirs, to provide against possible break in the canal lines, are suitably located. These are small and not in any wise elaborate, but in the aggregate they represent a con-

siderable investment of capital. There are twelve such reservoirs for distribution, as follows:

Name.	Elevation, feet.	Capacity in gallons.
Alta.....	3,800	8,500,000
Chalk Bluff.....	3,700	3,400,000
Leonard.....	3,000	13,600,000
Alta Hill.....	2,700	2,550,000
Manzanilla.....	2,850	3,400,000
Blue Tent.....	3,075	34,000,000
Ridge.....	3,500	1,700,000
Auburn.....	1,500	570,000
Loomis.....	400	8,500,000
Loomis (second).....	440	340,000
Camp Far West.....	1,000	2,550,000

In addition to these, the company owns lands covering its rights of way, to protect water rights, for reservoir sites, to prevent hurtful competition, in dimensions 4550 acres; and a number of placer mining claims, in aggregate area 948.27 acres, making a total acreage of 5498.27.

The standard of measurement is the "miner's inch," roughly estimated at 17,000 gallons per diem.

The rate for purposes of irrigation is \$45 a year per miner's inch. As one inch will suffice for seven acres of land, the expense to the farmer is less than \$7 for each acre. This compares very favorably with the rates of other water companies in California and the cost of irrigation in foreign countries.

Water for power is sold in miner's inches, except in case of special contract to deliver it in horse power, and is returned after use to the company's canals; the rate is 18 cents a day. An inch used on the latest designs of wheels will develop one-horse power under 412 feet pressure. Where the fall is considerable, therefore, canal water power is far more economical than steam, which in Placer and Nevada counties costs upward of 60 cents a day. The charge for water sold in bulk to municipalities is 18 cents per square inch and upward, according to amount, cost of delivery, etc.

Where water works are owned by the company, the dues are collected from families on a gross charge for general family use under liberal regulation charges; these average \$2 per month.

The following statement of plans for expansion of South Yuba Water Company is furnished by Resident Director Charles Van Norden:

1. To double the area of irrigation. The canals, at present, water about 10,000 acres, in and about Newcastle, Penryn, Loomis and Rocklin, but along the lines and before the terminals lie 200,000 unimproved; and at least half of these are, for location, soil and climate, desirable. The company is now engaged on a new canal line, destined to double the area under intensive cultivation. This is a continuation of the old Bear Valley and Dutch Flat ditch, formerly used to supply the monitors in the extensive hydraulic mining practiced throughout that region. It will bring a large stream—if necessary, 3000 inches—through Colfax to Clipper Gap, and will be very direct in its course, following the crest of a ridge and crossing declines by means of flumes and inverted siphons. At Clipper Gap this canal will empty into Auburn canal; while the flow from Bear river through the Auburn will be turned into the old Fidler's Green ditch, now renewed and enlarged. The latter will follow the ridge between the Auburn ravine and the North ravine; this, in size, will be seven feet wide at top and four at bottom, with a depth of three feet. The entire cost anticipated is \$50,000.

2. It is designed to supply Rocklin with water for municipal purposes and household use, under pressure, through a pipe line from the village of Loomis, which latter place is already provided for. The conduit will be 11 inches in diameter, and will empty into a village system of distributing pipes. The cost can hardly prove less than \$12,000.

3. It is the purpose of the company also to furnish Newcastle, Penryn, Loomis and Rocklin with electric lights. To the east of Newcastle a drop in a canal of 500 feet renders the development of many hundred-horse power feasible, and this will be utilized. The extreme distance of transmission is ten miles. The number of lights likely to be taken is 1000. The approximate cost is \$20,000.

4. The officers of the company are daily expecting instructions to proceed with a power-transmission scheme at Grass Valley. Southeast of this place a canal drops from the summit of the ridge to the bed of the Little Greenhorn creek, falling 500 feet in short distance. An electric station is to be built in the valley and 500-horse power transmitted along a pole line six miles long to a circle of needy mines. The precise route of the mine has not yet been decided upon.

5. Power will also be supplied the village of Colfax for electric lights and for factories on demand.

6. It is intended to erect a dam at the foot of Bear valley for storage; also a dam somewhere between Auburn and Newcastle, for storage and for regulation of distribution in the irrigated district.

7. The South Yuba has at disposal a vast amount of horse power running to waste at Newcastle, Auburn and

above, which sooner or later it hopes to utilize for factories, and it is prepared to bid very low to secure their installation.

8. The Fall Creek lakes, six in number, recently purchased, and the Omega lakes, three in number, also recently acquired, will with restored ditches, flumes and dams be connected with the great distributing reservoir (Lake Spaulding) above Bear valley.

The California Mining Exhibit.

Such progress has been made on the California mining exhibit at the Midwinter Fair as to render it certain that it will be the finest collection of ores and minerals ever made in this State, and probably in the United States. It will excel the mining display made at Chicago. Superintendent Edward H. Benjamin has worked very hard to make the exhibit a success.

Minerals approximating \$100,000 in intrinsic value have already been received. Other specimens are coming. The list of counties which will be represented on the floor of the Mechanic Arts building is given by Mr. Benjamin as follows: Shasta, Butte, Siskiyou, Calaveras, Santa Cruz, Amador, Plumas, Sierra, Nevada, Placer, Mariposa, Santa Clara, Kern, Tuolumne, Inyo, Mono, Contra Costa, San Bernardino, Santa Barbara, San Diego, Alameda, Napa, San Luis Obispo, Merced, Ventura. Nothing has been received from Trinity county, where the snow is three feet deep on the easiest road leading out of the mines.

Nevada county will make the largest exhibition of ore. A huge globe stands in the center of the Nevada county space, representing the bulk of gold which has been taken out of Nevada county alone. The globe is now white, but it will be gilded to make it look like gold. The bulk of gold which it represents is said to be worth \$205,000,000.

Sierra County will have an obelisk representing the amount of gold produced in that county alone, the value of the product being estimated at \$180,000,000.

Tuolumne county will have a revolving show case made of native woods, furnished with incandescent lights and containing gold specimens worth \$8,000.

Shasta county has an exhibit representing, by specimens, 142 mines in that county.

Amador county is at work constructing a tunnel which will show the geological formation of the mineral-bearing rock and all the realism of an actual mining tunnel.

Plumas county will have most of its exhibit which was at Chicago and which was a premium winner at the Columbian Exposition. It will be very handsome.

The most valuable display, intrinsically, will be made by Placer county, which will consist principally of fine gold specimens.

Santa Cruz will have a very interesting exhibit, embracing minerals and also fossils and curios.

Santa Barbara will show among other exhibits the largest block of asphalt ever quarried, weighing over four tons.

The State Mining Bureau will have a large exhibit, placing in position the pick of its attractive collections.

Siskiyou will exhibit for one thing its pictured rocks, on which there are landscapes imprinted by nature. One of these rocks has a picture of a lake and a perfect shadow of a forest and hillside. The tall trees have long shadows and the short trees have short shadows in this remarkable natural product.

Mariposa's exhibit will be small, but will contain some fine ores, among them being remarkably fine specimens of asbestos.

Butte has a fine display, auriferous gravel, quartz, talc, kaolin, chalk, limestone, fossils and Indian relics of past ages being included.

Santa Clara exhibits cinnabar and quicksilver. Quicksilver will also be exhibited from the Altoona district in Trinity county, and the two sections will furnish a lake of quicksilver on which cannon-balls and other heavy objects will float.

A space is reserved for valuable gold specimens, which will be exhibited handsomely arranged in show cases. Exhibits of this sort which are already received are included for the present in a large safe in the Mechanic Arts building in the mining section. Among the exhibitors are the following: L. M. Simon & Son, Scott Bar, Siskiyou county; Red Point drift mine, Placer county, principally crystallized gold; Power & Doolittle, Placer county, native gold and cement gravel; Mayflower mine, Forest Hill, Placer county, gold-bearing cement gravel; Morning Star mine, Iowa Hill, Placer county, native gold. Other exhibits of this sort are to be unpacked.

Beautiful specimens of travertine will be forwarded for the exhibition by Mr. Lindley of Mono county, who will exhibit something like 40 slabs about 4x6 feet in size. There are only two other quarries of travertine known, one being in South Africa and the other in France. Travertine is a very valuable building stone, examples of which are in the Mills building.

Napa county makes a fine exhibit of magnesite. A valuable discovery was recently made in Childs canyon. In Pennsylvania the deposit would be almost invaluable.

Alameda county will exhibit marble, manganese, carbonate of magnesia.

One interesting exhibit will be diatomaceous earth from Shasta county, a deposit of which was only recently discovered.

Nevada county's exhibit will include copper and copper products.

Calaveras county has a very fine display of free gold and copper ore.

Plumas exhibits, amid other products, native copper which can be cut with a cold chisel.

There is also to be seen native and magnetic iron from Shasta county. There is said to be a whole mountain of it on the McCloud river. In the Shasta collection there is a specimen of stalactites or iron drift from Charles Camden's mine, which will attract more than passing attention. It contains gold, silver and copper. It is almost pure iron.

A perfect fossil shell will attract attention in the Siskiyou county display.

The Kennedy mine, in Amador county, exhibits a pyramid of iron.

At one end of the State mining exhibit is the James Lick bronze statue, embracing the figures of three typical miners. This stands on a stout framework of timber, but the framework will be covered with slabs of handsome marble, which will constitute the exhibit of the Inyo Marble Company. At the other end of the exhibit is the facade which was shown at Chicago and which embraces for its materials marbles and other leading building stones of California.

Enough can be seen to warrant the assertion that the mining exhibit of the State will be remarkably attractive as a spectacle and very instructive even to many who are passably familiar with at least a part of the resources of California.

New Method of Treating Ores.

J. R. Moffitt of Stockton is the inventor of a new process of treating free-milling and refractory ores. The claims advanced for the process are:

First, the rock-breaker, which breaks up the ores, then the heated trough, through which the ores pass, drying as they go through to the pulverizer. It is necessary that the ores are heated to a certain degree for oxidizing and releasing the precious metals. This part of the work is done in the cyclone furnace; the granulated material passing within is banked in the rotating cylinder, which is heated by the wood fire under it, in a closed housing, with air pressure, to a red heat. The inner air cylinder has a number of troughs, each having a great number of blow-pipes, passing with increased motion with the outer cylinder, and having air valves to increase the air pressure in the blow-pipes. When these troughs are filling with the material of pulverized ores, and it being a red heat caused by the heated cylinder before mentioned, the blow-pipes at once cause a very high degree of heat in the material ascending, sufficient to volatilize and release from the precious metals all alloys or whatever combination may be therein. The cyclone motion given to the materials causes at once a perfect separation, oxidizing and forcing the gases to the upper tank of water, and under it to any depth desirable, the pipe being perforated, the air, etc., pass out of the water, much like a heavy mist, after the precious metals and materials, by their gravity, have passed down to the new device of the amalgamator—the material having passed through as described appears at this point very much like ashes. It is then passed on through the concentrator to a conveyor taking the tailings to the oxidizer, to again be treated. With the Moffitt system ores of the most rebellious nature are by atmospheric pressure and the high degree of heat, profitably worked. In ordinary cases, two tons per hour can be worked with this system at a less expense than any other system, and with less room and power, a simple shed being all that is necessary. The machinery is easily and cheaply transported.

THE Austin Reveille says that 70 men are employed at the Union, 17 at the Big Tunnel and about 100 men altogether by the Austin Mining Co. On the 15th of January the company paid out \$12,000 for December, 1893. The Big Tunnel is 8x8 feet, is now in 1500 feet and is being advanced at the rate of 200 feet per month. Two machines driving Ingersoll drills are run day and night. In the Union mine there is, on an average, 200 feet of new ground broken every month. The company is sinking a new shaft 300 feet between their office and the concentrator ore house. This shaft has been named the Cox shaft and is being sunk by James Roberts and Harry Harris.

Nickel-Steel in the Arts.

Extract from paper read before Colorado Scientific Society by W. L. Austin, Ph. D.

The price of nickel has been falling for several years, so that now, with the improvement in methods of producing the metal and its alloys, we can confidently expect to see its cost steadily reduced until it finds a ready entrance into the steel trade for other purposes than making armor plates and guns.

There is naturally some hesitation in using it, as is the case with any untried material, in places subject to great strains and extremes of temperature, such as occur in boiler plates, bridge building and marine engineering. A great many experiments must precede its adoption for such

that is, when the hole is large enough to admit a mandrel, and when so treated they are essentially improved. Nickel-steel shafting will not be altogether a novelty, however, for during the past summer the Bethlehem Iron Works completed a spare crank shaft for the American Liner, Paris, using nickel-steel of about 90,000 pounds tensile strength, which is said to be 25,000 pounds in excess of any shafting made by German or English manufacturers. This statement is, however, open to some doubt, for an English firm, which for a long time enjoyed an enviable reputation for the excellence of its shafting, owed its success, it is claimed, to the small quantity of nickel introduced into the steel used for that purpose. But this was before nickel-steel had begun to excite general interest.

The possibilities opened up before ship-builders and

The Midwinter Fair as It Is.

There appears on this page a view of the site and buildings of the Midwinter Fair as they actually appear, or, rather, as they appeared about two weeks ago, when the photograph was taken. Such a view is more satisfactory than the ideal bird's-eye view of the artist, because one can be sure of the truth of the machine. The view shows that the statements made of the extended and varied architectural features of the fair have not been exaggerated. Of course the point of view gives a close budding of the structures which does them discredit, because they have really large and well-ornamented interspaces and landscape garden effects, but otherwise it fairly presents the main features of the scene. Beyond the fair grounds



VIEW OF THE MIDWINTER EXPOSITION GROUNDS AND THE GOLDEN GATE. (From a Photograph.)

purposes, but when it finally wins the confidence of the engineers, and some rational and cheap method of reduction from its ores has been introduced, we may expect to see the consumption greatly extended and the production keep pace with the demand.

Very little has been published regarding the use of nickel-steel in the arts and manufactures. It is, however, quietly being experimented with. Last year it was decided to place sections of nickel-steel propeller shafting in the United States protected cruiser Brooklyn, and Battleship No. 1 (the Iowa). The ordinary carbon-steel used for such purposes has a tensile strength varying from 60,000 to 65,000 pounds per square inch, whereas the nickel-steel intended for the shafting spoken of will show a tensile strength of 90,000 pounds per square inch, the elongation being in both cases about the same—20 degrees. Using this stronger steel for the purposes specified will warrant removing the interior metal by boring, thus materially lessening the weight while preserving the efficiency. Such bored-out castings may in some cases be hollow forged—

architects when a steel is obtainable by them with over 100,000 pounds tensile strength and an elastic limit in proportion, without seriously impairing elongation or reduction of area, have a tendency to lead into flights of fancy which it is premature to indulge in before this material has stood the test of prolonged usage.

By preparations for war the arts of peace are advanced, and to the navy department of the United States is largely due the practical development of the most valuable qualities to which the metal nickel can lay claim. In the probable extension of this at present almost wholly war material into the arts and manufactures lies the main hope of nickel in the immediate future.

E. B. WAGY, one of the syndicate interested in the San Marcial coal fields of Sonora, has recently returned to Tucson. He states that two shafts have been sunk, one to the depth of 90 feet penetrating a six-foot stratum of pure anthracite coal, another to a depth of 35 feet penetrating a seven-foot stratum. The coal is of very high grade.

are the stretches of sand dunes which lie between its northern boundary and the shores of the strait known as the Golden Gate. Upon this narrow flow of water floats all the shipping which traverses bay and ocean from the port of San Francisco. Across the Golden Gate lies the shore of Marin county, and the elevations in the distance are those of the Coast Range, with Tamalpais as reigning crest, in the immediate vicinity of San Francisco. The picture has interest aside from its embodiment of the outer features of the fair, because it gives a view across the Golden Gate, while all conventional views are at right angles with this and show in profile the headlands through which, at some remote era, the great interior waters of California forced their way to union with the Pacific ocean. The fair grounds are picturesquely environed and the adjacent country should receive attention from the visitor.

It ought to be mentioned that the electric tower, which rears itself from the grand court to a height of 250 feet, is not shown in the illustration. The tower has now been reared and will be one of the most conspicuous features.

An Address in Favor of Good Roads.

The address to the people of Sacramento county by the committee which has in charge the bonding proposition for the construction of good roads, is significant in all California counties, and for this reason we present the following portions:

The Executive Committee of the County Road Convention solicits the electors of the county to sign petitions to the supervisors, to submit to the people the question whether they favor a bond issue for 40 years of call bonds for \$500,000, at not over five per cent, for the construction this year of certain trunk lines of permanent highways in macadam.

The estimated aggregate length of the roads is about 156 miles, to be in tracks of 16 feet, and built under the supervision of competent road engineers and by contract.

It is local option in perfection; it is bringing government near to the people; it is the right way to determine such questions before beginning active work.

All the assessable property in the county is liable under such a scheme. Sacramento electors within town and city limits propose to share quite half the burden, thus enabling the whole people to join in the work, since all the people will reap the benefits.

Road-building is of two kinds—temporary and permanent. The earth and the gravel roads are of the first, macadam of the second class.

A Macadam Road Explained.—A macadam road is made by first preparing the earth with but a slight crown, or rounding, with as little disturbance of the soil as may be; then it is rolled by improved machinery thoroughly. Next is laid on about seven inches of coarse broken trap-rock, of which broken cobble is a high order and is plentiful. The interstices are then filled with smaller broken road metal, and the whole again rolled hard and smooth. Then is put on six inches, more or less, of fine broken stone, and that is dressed with stone dust or pulverized rock, and the whole rolled hard and smooth, creating a water-shedding roof, commonly called a "surface."

In brief terms, that is a good macadam road, and with little care will not alone last hundreds of years, always smooth, clean and offering least resistance to wheel or hoof, but it increases speed of movement, lessens wear and tear, and adds threefold to all hauling capacity.

All testimony everywhere is that such roads are the cheapest. In the interest of economy they ought to be built on a systematic and comprehensive plan, and not by a hand-to-mouth and long-delayed doing by piecemeal, for the latter process destroys system, postpones benefits many years, and gives no assurance of continuance of the work from one administration to another.

While these 156 miles of trunk roads cannot reach to every man's door, they will make the main lines, around which a branch system will grow up. To every man they will offer just so much mileage of good road as he now has to cover on bad road on reaching main line and going thence to the common center—the county seat.

Vast Sums for Patchwork.—The cost of systematic construction is most just when distributed over a long period and put in part upon those to come after us, who are to be the greatest beneficiaries.

The interest paid comes back many fold in the benefit gained. Raising some \$40,000 a year for road purposes, Sacramento county, in 40 years, if she goes on under the present system, will raise by direct tax the enormous sum of \$1,600,000, and will have to show for this great outlay of money only such roads as she now has.

Taxes Will Really Be Lessened.—Under the bonding plan, which is not new, but has been proved by trial elsewhere, the entire cost, distributed over the same period, will be \$1,062,500, principal and interest, and meanwhile we will have all the uses and benefits of the macadam system.

We append a table showing this in detail, but take note that therein no account is made of the certain increase of values by reason of the work proposed; also, the calculation is made on the basis of \$34,000,000 of assessment roll, city and county, whereas we venture the statement that within five years the assessment roll will increase to \$40,000,000, and within ten years to \$50,000,000 by reason of this needed improvement; hence the tax will go down.

The present road tax is 25 cents on county property only, and all agree will never be less under the old system, that which we have pursued for the past 40 years.

But under the new it will not, after the completion of the new trunk lines, be so great, because the enormous cost of maintenance of present roads will be reduced (to the extent of 156 miles, or so much as we can build with the fund) to less than one-third the present cost of maintenance. This is seen when we tell you that there are 400 miles of road in the county; the new macadam will absorb within 44 miles of half of all these roads. So we estimate that the present road tax will not be increased, certainly not after the roads are completed, and that pres-

ently it will pay the interest, the principal and the cost of keeping all the other roads as now cared for. Probably it will decline very early, since the assessable values must increase under the new system alone and the cost of maintenance decline accordingly. If the new system is adopted, no more tax money will go into the trunk lines under the old system, and these lines now absorb seventenths of all the money spent on roads.

We cannot now enlarge to you upon the benefits of the proposed scheme. Aside from the confessed advantages of it to all people of the county, whether on the trunk lines or somewhat removed, it will put into circulation in the county a large sum greatly needed, and in its expenditure our own people and those with families will be preferred. The work will be done with proper machinery, which the county can own for further use, under competent engineering supervision and with all the care and circumspection possible to employ.

The proposed good-road plan not alone benefits the people living in the country, but must be of great benefit to the people living in the city. The country must first be prosperous before the cities can thrive. Increase in population and in prosperity in the country means increased value to city real estate, increased business for the shopkeeper and merchant, increased and more steady labor for the wage-earner. Hence, if the owner of city property wants his lots and his houses to be worth more money, if the city shopkeepers and merchants want more customers, if the city wage-earners want steady employment and more of it, it is to their interest to help along this movement, which, as shown in other counties, must add to the wealth and prosperity of the entire county, and must place Sacramento county in the front rank among the progressive counties of California.

History of One Cœur d'Alene Mine.

The sale of the Morning mine of Mullan by Receiver Schley for a consideration aggregating \$251,000, as reported in the press dispatches sent out from Milwaukee on Saturday, is the last of a series of transactions which have made that property one of the most historical mines in the Cœur d'Alenes, says the *Spokane Review*. The Morning is a low-grade property, but it was once worked to considerable pecuniary advantage by its owners. The complicated series of transactions of which it has been the subject for the past three years began with the suspension three years ago of the Spokane National Bank and the Hussey Banks at Wallace and Mullan immediately afterward.

At the time of the bank failure there was a first mortgage on the mine, amounting originally to \$100,000, which had been reduced to \$54,000, held by Head of Chicago, and known in subsequent deals as the Head mortgage. A second mortgage, to secure \$100,000, held by the Spokane National Bank, and liens and attachments subsequently placed on the mine brought its indebtedness up to \$370,000. The liens included the indebtedness of the suspended bank at Wallace to the county of Shoshone. When Herman L. Chase assumed the receivership of the Spokane National Bank, negotiations were set on foot to sell the mine. They were involved in almost endless difficulties, because it was necessary, in order to pass title, to lift some of the claims. All of the holders in turn declined to release their claims, and it became apparent almost from the start that no first payment within reason would be sufficient to take up \$370,000 worth at once.

The mine was finally sold to a syndicate organized as the Morning Mining Company of Milwaukee, the consideration being \$400,000, half in cash. Receiver Chase then made a proposition, as receiver of the bank, to release the second mortgage held by the bank, on condition that others would release their claims for the purpose of passing title. The company, in turn, agreed with the receiver to expend not less than \$100,000 within six months for permanent improvements. The improvements were specified—a concentrator of a daily capacity of 300 tons and a railroad to the mine. Receiver Chase also took a first mortgage in lieu of the money he was to have received on the original second mortgage, to the amount of \$200,000. The terms of the remaining payments were dictated by the receiver. There were three equal payments in all of \$66,666.66 each. The first matured Oct. 1, 1893; the second will fall due April 1st of this year, and the last a year from the first. The notes were, in turn, cut in three parts for convenience in subsequent negotiations and were of the denominations of \$20,000, \$20,000 and \$26,666.66. All the notes were discounted in the East, in various quarters, and the money thus obtained was devoted to paying much of the 90 per cent dividend subsequently declared to the depositors in the Spokane National Bank.

The mine then entered, in common with the rest of the Cœur d'Alenes, upon a period of depression. First came the labor troubles and then unfavorable legislation, which forced the prices of silver and lead down to the lowest

notch. The mine failed to earn even the interest charges accruing against it, and defaulted the first ones due. Under the terms of the mortgages, the noteholders applied for and obtained a receiver. For the same reason that the purchasers could not make the mine pay, the receiver failed to, and the court ordered the receiver's sale, under which the latest transfer of the series was made last Saturday.

The new purchaser, Charles F. Pfister, represents the largest owners, and the sale practically amounts to a transfer from the original purchasers to themselves, with a consequent freeing out of the small fry of the original corporation.

The early efforts to dispose of the mine in such a manner as to bring the greatest amount of ready cash will some day make a volume in the history of western mining ventures. The mine was practically sold a dozen times, and the air was constantly full of rumors and contradictions, while the principals in the various deals were hovering constantly between hope and fear. The first sale was made to a syndicate organized by the intrepid adventurer, Jim Wardner, the price named being \$750,000. The purchasers relied upon the expert judgment of General Her, the millionaire mine and smelter operator. At the critical period, however, labor troubles on the scene of his own investments kept him so busy that he failed to come to Idaho and the whole sale was frustrated.

Two mining men named Bratenober and Wertenweiler then negotiated for the Morning mine on behalf of an English syndicate, the price finally agreed upon that time being \$700,000. Bratenober made his reputation in the Drum Lummond of Montana, and his partner—Wertenweiler—was a California expert, a consort and confidant of such well-known magnates as the Hearsts, the Mackays, Jim Flood and Lucky Baldwin. There was trouble about arranging the terms. The syndicate wanted too much time for the first payment, and the others were anxious to obtain a considerable sum of ready cash. So that transaction fell through, and the Bratenober-Wertenweiler syndicate purchased the famous De Lamar mine in southern Idaho. The De Lamar has since, under the direction of Manager Plummer, who was retained immediately afterward, paid dividends averaging \$50,000 a month clear. It was bought for \$2,000,000, on the terms of payment declined by those who controlled the Morning.

A German syndicate next negotiated for the property at \$600,000, and one day the contract was signed in Spokane, the papers all being duly executed. Financial troubles of their own caused the German gentlemen to withdraw. Capitalists of New York, Boston, Hartford, Conn., and other money centers were induced in turn to consider the proposition, and in turn the deals were defeated by difficulty in obtaining enough ready cash. The final sale was made under some pressure, but it met the primary requirements of the receiver of the bank in almost every particular.

But the Morning mine is to this day considered a splendid property if prices of lead and silver ever come to be restored. "There is enough ore in sight," says a well-known mining man of the Cœur d'Alenes, "to pay for it. If lead were worth anything at all, the Morning would be all right. You can measure enough ore with a two-foot rule to pay for it; and if favorable conditions ever come back to us, it will take but a few weeks to put the property on a dividend-paying foundation once again."

PAPERS in a suit to establish the ownership to the waters of Santa Ana river have been served at Riverside. The suit is brought by the Anaheim Union Water Company and Santa Ana Irrigation Company, both corporations of Orange county. The two companies lay claim to 12,000 inches of water running in the Santa Ana river; and it is to have this claim established that suit has been brought.

ALL the arrangements for the running of the Canadian Pacific trains through to Seattle over the Great Northern coast lines, which begins February 1, have been completed. Not only will Canadian Pacific cars run through to that city, but the first-class train of the Great Northern will run through Vancouver.

JUDGE VIRDEN, of Mono county, decided that sheep may not be watered in a creek which had been used for irrigating purposes by a rancher near Bridgeport. His decision was sustained by the Supreme Court. The injunction against the sheep men was made perpetual.

F. L. LEONARD, a young man mining four miles east of Leland, Or., brought in a nugget of gold covered with quicksilver Wednesday. The value of the lump is about \$35. It resembles a piece of amalgam, though he insists the nugget is just as he picked it out of the ledge.

IDAHO capitalists propose to utilize the Shoshone falls of the Snake river to generate electricity to operate a railroad 40 miles in length.

Scientific Progress.

Submarine Photography.

One of the most interesting scientific experiments of recent years was the photographing under water done in the Red sea by Louis Boutan, the botanical lecturer in the Sorbonne, Paris. In the course of this submarine work, M. Boutan discovered many curious plants and fish which were absolutely unknown before, and which have been presented since by the sub-aquatic explorer to his classes. A few days ago M. Boutan discussed his novel invention with a New York World reporter.

"My experiment came about in this manner," M. Boutan said. "While making a course of researches along the shores of France and in the neighborhood of my laboratory at Banuyls-sur-Mer, I was struck with the beauty of the deep-water fish that it was really impossible to put in an aquarium where scientists could study them, for the reason that so soon as they were brought into shallow water or taken into the air their beauty faded and their entire form appeared to undergo a physical metamorphosis that was destructive of their beauty of outline and shape. Therefore I resolved to try to preserve their perfect form by means of photography.

"At first I endeavored to make the picture by the aid of the light that penetrated the water, but while this is considerable I found that below a certain depth, and that a very moderate one, this light was altogether insufficient, and so I was driven to the necessity of designing an apparatus for burning a magnesium light under water that would provide me with the artificial sun required.

"This apparatus consists of a tank filled with oxygen and surmounted by a glass globe containing an alcohol lamp. On the flame of this lamp is thrown, by means of an automatic arrangement, plinches of powdered magnesium, producing a powerful, almost blinding light at the moment the camera is snapped to take the picture. The lower end of the tank is pierced so as to admit the sea water, which takes the place of the oxygen, as the latter is gradually consumed, and thus the steady, regular pressure is preserved.

"Armed with a machine constructed after this fashion, I sought the most picturesque site possible at the bottom of the Red sea and made by negatives.

"From beneath almost every rock I saw the long tentacles of some species of devil-fish, or octopus, feeling around in the water, seeking to seize an unwary fish that might venture too close to the repulsive object. Fortunately, perhaps, for me, I saw none of these creatures with tentacles longer than 36 inches, and therefore I was not interfered with in any way by them.

"But several such lights as that, with an occasional monster even more repulsive than these are, robbed the place of much of its beauty, and frequently drew my startled attention so abruptly from the pleasing surroundings as to make the contrast very marked. Sometimes these repellent objects would persist in swimming about me to such an extent that I was forced to attack them with a stick or cane I had, and then they would flee to the protection of the rocks."

Variability of the Wind.

Dr. Langley of the Smithsonian Institution advances a new theory as to the nature of wind which he thinks goes a long way toward determining the ultimate possibility of mechanical flight. The wind is not, the doctor says, even an approximately uniform moving mass of air, but consists of a succession of very brief pulsations, varying in amplitude, and, relatively to the mean movement of the wind, in direction also. Once launched into the mean velocity of the wind

a flying machine, therefore, if it had the power to vary its inclination, could take advantage of the varying velocity and direction of the wind. Falling with the slower wind it would accumulate the energy which it would have to expend in rising with the higher, and thus become capable of indefinite sustenance or advance. It would require, however, an even more intimate knowledge and quick perception of the currents of the air than a mariner possesses as to the currents of the sea.

Explosiveness of Coal Gas.

In the use of mixed gases for lantern purposes the question sometimes arises as to whether coal gas or pure hydrogen is most readily exploded in case of a rise of temperature. An important contribution to our knowledge has recently been made by Professor Victor Meyer. It was found that with pure hydrogen and oxygen the initial temperature required to cause explosion varied between 612° and 686°, no difference being found whether the gases be dry or moist. The presence of platinum foil prevented explosion, quick combustion always took place even when a temperature of 715° was reached. When hydrocarbons were used with oxygen it was found that the temperature needed to induce explosion was lower the greater amount of carbon present. Thus the mean temperatures of explosions with methane, ethane and propane were 657°, 616° and 547° respectively. It will thus be seen that whatever the difference may amount to in practice it is a fact that pure hydrogen and oxygen will be more difficult to explode than mixtures of coal gas and oxygen.

Chromium and Aluminum.

A new process has been introduced for imparting hardness to aluminum by the addition of chromium. In consequence of the difference in the fusing points of the two metals, certain precautions have to be taken to alloy them both, and if electrolysis is employed for the purpose, it is stated that one or another of the known methods can be used, and the alumina, salts of alumina, cryolite, etc., treated direct with a determined quantity of salts or oxides, chromium, granulated chromium, or chromium in any other suitable condition.

Artificial Ice.

The Massachusetts State Board of Health concludes, from investigations of artificial ice, that artificial processes of freezing concentrate the impurities of the water in the inner core or the portion last frozen; that the impurities are least if distilled water is used; that the number of bacteria in artificial ice is insignificant, under the prevailing methods of manufacture; and that the amount of zinc found in ice is insufficient to cause injury from its use.

How to Mend Crockery.

A correspondent of the *Scientific American* says. Before being allowed to get dirty or greasy tie all the broken pieces in their places nicely with any kind of string that suits, then put in an iron or tin dish that can be put on the fire, pour in as much milk as will cover the fractures well, put on the fire and boil for say ten minutes, and the whole operation is complete. Don't undo the wrapplog until the dish is completely cold, and if yours hold as ours do you will call it a success.

To Arrest a Cold.

Tincture gelsemium.....gtt. 2
Liquid ergot....." 5
Camphor water.....dr. 4

Mix and take every hour immediately the cold is felt. If this is taken for twelve hours, at the same time keeping indoors in the warmth, many a cold will be cut short.—Cor. Bl. Schweiz, Aertze.

Metallurgy and Ores.

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Assessment Notices.

OCIOENTAL CONSOLIDATED MINING COMPANY.
—Location of principal place of business, San Francisco, California. Location of works, Silver Star Mining District, Virginia, Storey County, Nevada.

Notice is hereby given that at a meeting of the Board of Directors held on the fifteenth day of January, 1894, an assessment (No. 15) of Ten Cents (10c) per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary at the office of the company, Room 69, Nevada Block, 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 15th day of February, 1894, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on WEONESSDAY, the 14th day of March, 1894, to pay the delinquent assessment, together with the cost of advertising and expenses of sale. By order of the Board of Directors.

ALFRED K. DUBROW, Secretary.

Office—Room 69 Nevada Block, No. 309 Montgomery street, San Francisco, California.

DELINQUENT SALE NOTICE.

STANDARD GOLD AND SILVER MINING COMPANY. Location of principal place of business, San Francisco, California. Location of works, Butte County, California.

Notice—There are delinquent upon the following described stock, on account of Assessment (No. 1) levied on the 18th day of December, 1893, the several amounts set opposite the names of the respective shareholders, as follows:

Names.	No. Cert.	No. Shares.	Am't.
E. McGrath.....	32	500	\$25 00
E. McGrath.....	34	500	25 00
E. McGrath.....	35	500	25 00
Sylvester Gardner, Trustee.....	46	1,000	50 00
Sylvester Gardner, Trustee.....	62	200	10 00
Sylvester Gardner, Trustee.....	63	1,000	50 00
Sylvester Gardner, Trustee.....	66	1,000	50 00
Sylvester Gardner, Trustee.....	63	500	25 00
Sylvester Gardner, Trustee.....	69	3,750	187 50
E. McGrath.....	74	2,000	100 00
Sylvester Gardner, Trustee.....	75	2,000	100 00
Sylvester Gardner, Trustee.....	78	16,575	828 75
Sylvester Gardner, Trustee.....	82	1,000	50 00
Sylvester Gardner, Trustee.....	100	9,490	474 50
Sylvester Gardner, Trustee.....	102	10,000	500 00
Sylvester Gardner, Trustee.....	103	10,000	500 00
Sylvester Gardner, Trustee.....	104	2,065	103 25

And in accordance with law, and an order of the Board of Directors, made on the 18th day of December, 1893, so many shares of each parcel of such stock as may be necessary, will be sold at public auction, at the office of the Company, 330 Pine St., Room 4, San Francisco, Cal., on SATURDAY, the 17th day of February, 1894, at the hour of 1 o'clock P. M. of said day, to pay said Delinquent Assessment thereon, together with costs of advertising and expenses of sale. T. E. JEWELL, Secretary.

Office, 330 Pine Street, Room 4, San Francisco, Cal.

J. F. CROSETT,

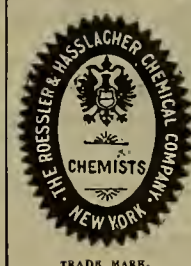
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K₄Fe (O N₃ H₃O)₆

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BACK FILES of the MINING AND SCIENTIFIC PRESS (unbound) can be had for \$3 per volume of six months. Per year (two volumes) \$5. Inserted in Dewey's patent binder, 60 cents additional per volume.

Mechanical Progress.

Automatic Fog Signaling.

The latest attempt to solve the problem of automatic fog signaling is that which has been made by J. F. Dixon, who effects this object by an ingenious and practical mechanical contrivance enclosed in a deal casing about five feet square and standing a foot or so above the ground level, says the *Colliery Guardian*. It is placed beside the rails and connected up with the signal man. Like that signal, its normal position is at danger—that is, a fog signal or detonator is on the rail. In clear weather the detonator is withdrawn from the rail, and is kept clear of it by raising a lever and fixing it in that position, but when a fog occurs the lever is released and the detonator is placed on the rail ready for a passing train. The mechanism consists mainly of an arm fitted with a jaw or clip, which acts like a bird's beak the arm being capable of horizontal rotation through half a circle. In clear weather the arm, with a detonator held in the clip, lies parallel with the rail and pointing to the left. When a fog comes on, the fog man—who can attend to several sets of apparatus—is summoned, and he releases the lever. This brings the arm out at right angles with the rail, and the detonator is held on the top of the rail. When a train passes the spot the leading wheel of the engine explodes the detonator—or rather two detonators in succession, for the apparatus is in duplicate in order to insure against a misfire. Placed close beside the rail and within a few feet of the detonator apparatus is a long inclined lever, over which the flange of the leading wheel of the engine passes, depressing it. This lever is connected with the apparatus, and its depression causes the radial arm to swing round to the right and to enter the casing of the apparatus. As it enters, the jaws of the clip are made to open, and the case of the detonator is dropped into a receptacle. Proceeding a few inches farther on its travel, the clip seizes hold of a fresh detonator from the magazine, the arm slowly swings back toward the rail, and finally stops at right angles to it, holding the fresh detonator over the rail ready for the next train, which, when it arrives, passes over it and causes the cycle of operations to be repeated. The return of the clip to the rail is retarded by a very ingenious dash-pot, or air-cylinder, arrangement, which insures that the fresh detonator shall not be placed in position before the train has passed well clear of the point where the previous one was exploded. The dash-pot arrangement also prevents the lever from rising rapidly and being subjected to blows from the following wheels of the engine and train. When the fog clears up, the detonator is pulled off the line by the action of the danger signal, but it would be put on again when the signal was set to danger, unless the lever were propped up as already described, and this should be done by the fog man before he leaves duty.

Wood-Working Machinery.

Some ingenious devices in wood-working machinery have lately been brought forward, in especial a boring mechanism to be used in making holes for blind railing in hard wood floors, the working being entirely automatic; that is, the stock is carried forward by a fluted roll, and is stopped by a cam at proper distances from the boring of holes by the bit which works horizontally, the board being carried on an angle, says the *Manufacturer's Gazette*.

Another most useful and novel arrangement in this line is a hard wood flooring machine which takes the rough stock, planes it on both sides, and matches it; there are five cutting cylinders; the first having a flexible bar, which allows of the free passage of irregularities in stock, and insures the presentation to the cylinders of a uniform

surface, this being followed by top and side and bottom finishing cylinders; the side finishing cylinders are equipped with a weighted chip-breaker bar, which prevents splintering the stock; there are six feed rolls of 9½ inches diameter, and the back rolls are placed beyond the last cylinder, thus carrying all stock clear through the machine.

Steam Engines.

In a paper read before the London Society of Firemen and Engineers, the following ideas were brought out:

It is the province of mechanical engineers as the makers of the steam engine to produce a machine that will utilize with the greatest economy the fuel by which the steam is generated. Comparing the same engine with a well-constructed turbine water-wheel, the latter is found to be by far the most efficient, giving off an effective work of 75 per cent of the fall of the water, whereas the steam only produces 7½ per cent of the total effective heat produced by the combustion of the fuel in the furnace. The losses are represented by 40 per cent lost in causing of draught necessary for combustion. The remaining 60 per cent is given up to the engine to be turned into work, of which quantity only 7½ per cent is utilized.

According to theory, two pounds of coal should produce 7½-horse power, whereas in the best engines we get only 1½-horse power. These losses are caused by condensation and radiation in the cylinder passages. By the use of the condenser, which would not be required in an ideal engine, as in such an engine, the whole heat having been utilized, the water of condensation would be better drawn away. Compounding the engine has been a means of improvement, by enabling the boiler to work at high pressure, and give the engine, therefore, a greater expansion. But this can only be carried to a certain extent. To further improve the steam engine, a better means of burning the fuel in the boiler must be devised by forced draught, and raising the temperature and pressure as far as the material will safely permit, and by more economically utilizing the heat of evaporation through a moderate range of expansion in well-proportioned cylinders.

Stone Work.

Stone walls are measured by the perch (24½ cubic feet), says the *Clay Journal*. Openings less than three feet wide are counted solid; over three feet deducted, but 18 inches are added to the running measure for each jamb built. Arches are counted solid from their spring. Corners of buildings are measured twice. Pillars less than three feet are counted on three sides as lineal, multiplied by fourth side and depth.

It is customary to measure all foundation and dimension stone by the cubic foot; water tables and base courses by lineal feet. All sills and lintels or ashlar by superficial feet, and no wall less than 18 inches thick.

The greatest safe load on super. foot on
Granite piers..... 40 tons
Limestone piers..... 25 "
Sandstone piers..... 15 "
Brick work in cement..... 3 "
Rubble masonry..... 2 "
Lime concrete foundations..... 2½ "

The height of brick or stone piers should not exceed 12 times least thickness at base.

First Iron Bridge.

The first iron bridge ever erected in the world, and which is in constant use at the present time, spans a little river in the county of Salop, on the railroad leading from Shrewsbury to Worcester, England. It was built in the year 1778, is exactly 96 feet in length; total amount of iron used in construction, 378 tons. Stephenson, the great engineer, in writing concerning it, said: "When we consider the fact that the casting of iron was at that time in its infancy, we are convinced that unblushing audacity alone could conceive and carry into execution such an undertaking."

Useful Information.

Do Not Cough.

In all bronchial affections the paroxysms of the cough should be placed as far as possible under control of the will, says the *Youth's Companion*. The old idea that disagreeable sensations in the throat indicate the presence "something there which ought to come up" has been entirely displaced by the more rational view that the continued and prolonged efforts to expel that "something" are often productive of more mischief than would result from its being allowed to remain.

There is attendant upon every disease of the bronchial tubes a greater or less amount of mucus, which exudes from the membranous lining of the tube. Of course, there are the accompanying signs of inflammation—heat, pain, swelling and redness; but it is the mucus exudation which is for the most part responsible for the disagreeable sensation which we instinctively attempt to alleviate by coughing.

Now it is certain that, in a great majority of instances, where the general health of the patient is not attacked, this exudation undergoes what is called resolution; that is, it is re-absorbed through the fine network of the blood, where it is taken care of, and complete recovery is effected. On the other hand, let us suppose that we do not wait for the resolution to take place; but that, on the theory that every part of the exudation should be expelled as being of a poisonous nature, we strain to exhaustion every muscle of expiration, and, in fact the whole system. What follows?

We may have accomplished our immediate object, or the seat of the inflammation may have been out of reach. In either event, if we could see the point at which our efforts had been directed, we should discover that they had not been productive of the results anticipated. Instead of the inflammation being in any way allayed, we should find that an effect had been produced similar to that which follows scratching an itching sore. The irritation has for a moment been relieved, but it is only a question of time when it will return with renewed energy.

The habit of endeavoring to expel more of the exudation than will come away with gentle and infrequent coughing is an exhausting and idle one.

Purification of Resin.

One process consists of melting the resin and passing through it a current of chlorine gas, acidifying with sulphuric acid, washing with boiling water, and finally with hot water containing nitric acid, says the *Scientific American*.

Another process consists of melting and then boiling the resin with a saturated solution of salt. After boiling for some minutes in a solution of chromic acid or a solution of bichromate of potash with twice its weight of sulphuric acid, it is washed with a slightly ammoniacal water.

Another method consists in heating the resin with a mixture of chalk, dioxide of manganese and potassium bichromate and filtering through sand. Heating with powdered zinc, with or without sodium bisulphate, has also been suggested. Sulphuric acid and zinc chloride at high temperatures have also been tried.

Seemingly the best process consists of first filtering to separate insoluble matters and dirt, then heating to about 150° C. with five per cent of zinc chloride for an hour or two, and then adding 12 per cent of bichrome in the form of a powder. After sufficient heating, the mass is allowed to cool down to 100° C. and is filtered. Lastly we have to mention purification by anhydrous sulphuric acid with heat under pressure in a sheet-iron caldron which can be heated by superheated steam and fitted with a cover capable of re-

sisting a pressure of five kilos. to the cubic centimeter.

In this 100 kilos. of the resin to be purified are placed, heated to fusion, the pressure raised to four kilos. and the sulphuric acid added. The whole is heated to 100° C. for an hour, when it is left to cool, and washed with boiling water. The sulphuric acid process and the zinc chloride process are often worked in conjunction with each other.

The Humming Bird at Home.

While spending the winter in California, I made my first acquaintance with Madam Hummingbird "at home." In the first place the location could not have been improved upon. Just picture in your mind a lawn dotted with orange, lemon, fig and palm trees, with here and there a giant century plant, or bunch of pampas grass, and no end of flowers. While a cypress hedge, overshadowed by stately encalyptus and pepper trees, separated the lawn from the street. One day while gathering oranges, I was startled by the rapid and angry darting of a humming bird near my face, which led me to look closely in that part of the tree, which resulted after a little search in the discovery of my first humming bird's nest. It was placed on a twig not as large as a lead pencil, on one of the lower limbs of the orange tree, and it was so colored with lichens the same color as the bark of the tree that it was difficult to find it again even after I knew about where it was. The nest is about the size of the burr oak acorn cup, built almost entirely of the feathery plumes of the pampas grass, covered with green lichens, and all held together, and to the limb, with something greatly resembling spider web. Within this "marvel of construction" were two semi-transparent eggs, almost too small to describe, and my efforts to use the blowpipe on them blew them all to smithereens.

Before taking the nest, I visited Madam Hummingbird several times, and nearly always found her at home. She never left the nest but a few minutes at a time.—Frank Ford, Mag. of Nat. Sci.

Historic Battlefields.

At Cannae, where the Romans sustained the worst defeat they ever experienced, there were 140,000 men on the field, of whom 52,000 were killed.

At the battle on the Thrasymene, where Hannibal defeated the Romans, there were 65,000 men engaged, of whom 17,000 were killed.

At Gettysburg 140,000 men fought on the Union and Confederate sides, of whom 8000 were placed hors de combat.

After the surrender of the Turks at Plevna the Russians took possession of \$17,000,000 worth of arms.

At Borodino 250,000 French and Russians fought, and the dead and wounded numbered 78,000.

During the retreat from Moscow the French lost or threw away over 600,000 muskets.

At Waterloo there were 145,000 men on both sides, of whom 51,000 were killed or disabled.

There were 402,000 men on the field of Sadowa, of whom 33,000 were killed or disabled.

At Austerlitz 170,000 were engaged and the dead and wounded numbered 38,000.

At Gravelotte 320,000 men were engaged, of whom 48,000 were killed or wounded.

Morengo called 58,000 men into action, of whom 13,000 were killed or crippled.

At Bannockburn 135,000 men fought, and 38,000 were killed or wounded.

Powerful Crane.

The most powerful hydraulic crane at present existing is reported to be one at the Italian government arsenal at La Spezia. It is capable of lifting 160 tons.

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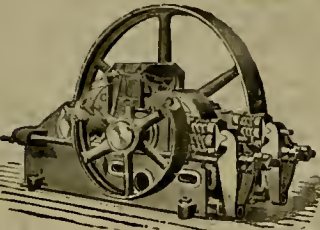
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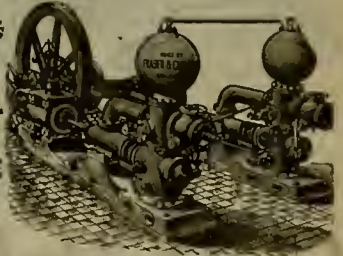
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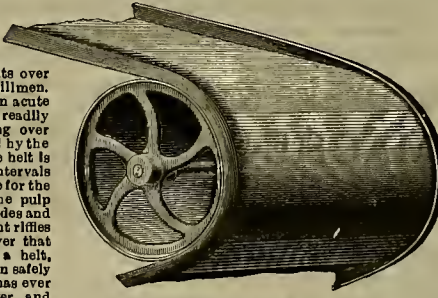
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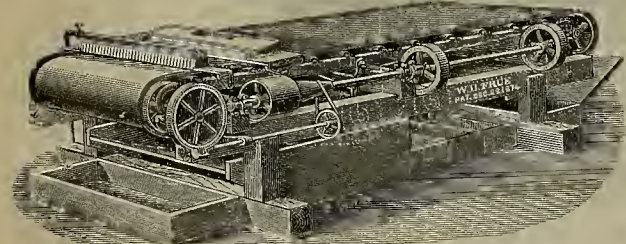
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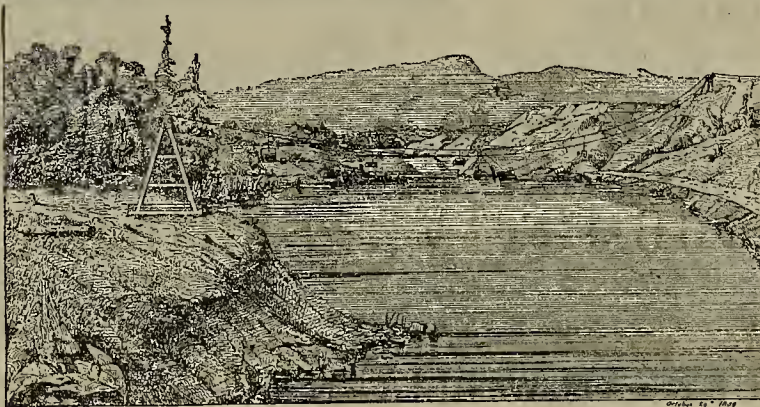
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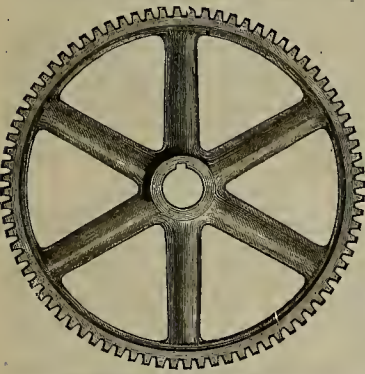
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Mining Summary.

The following is mostly condensed from journals published in the interior, in proximity to the mines mentioned.

CALIFORNIA.

Amador.

SHUT DOWN.—*Ledger*: The South Spring Hill Company shut down its mill on the first. A few men will be continued at work prospecting in the Medium, a property recently purchased by the South Spring Hill Company. This is a severe blow to Amador, for, in addition to being thrown out of work, many of the men have as much as three months wages coming to them.

The Hardenburg people are engaged in improving their hoisting machinery, and expect in a few weeks to get to work at opening up the ledge they recently encountered, with as large a force of men as possible.

The miners in the Zeila have been compelled to lay off one or two shifts this week on account of water, which has kept the hoist so busy that rock could not be hoisted. The mill ran all the time, however.

Butte.

BIG MINING TUNNEL.—*Oroville Mercury*: It is stated that the big Stow mine at Forbestown will soon be drained by a tunnel which will be run in the hill below the mine, tapping the ledge at a probable depth of 1000 feet. The mine will thus be drained without the aid of pumps, and possibly the ore will be delivered through the tunnel, avoiding the necessity of hoisting works. The Stow mine has shown itself by development to be one of the most extensive and profitable on the coast. It will require an immense outlay to construct the tunnel, but when completed the mine will be worked at greatly reduced cost. Heavy machinery is now on the way to the mine for this purpose. Barley drills run by air compressors will be used. The length of the tunnel is not known exactly, but it will probably be no less than a thousand feet long.

Kern.

THE NEW PLACERS.—The Los Angeles Herald claims to have carefully investigated the new gold districts of Goler, Red Rock and Summit, northeast of Mojave, and from entirely trustworthy sources has gathered information which it prints, and of which the following is a summary:

"The influx of miners to Red Rock continues heavy. Many are disappointed, but many others make money. An instance occurred recently where a claim was purchased for \$6000, and the next day the buyers were offered and declined the same sum for a third interest. The present manner of working with dry washers is crude, but the owners are sure they will take out \$200,000, even with the present appliances. The wasteful method used is illustrated by the fact that three men worked on tailings from the dry washers and took out three ounces of fine gold in one day. Martin Stoddard is a miner who is doing well. He sold 24 ounces of gold at Mojave last week that he had taken out in a few days. His vein of pay dirt is from four to five feet thick. At Goler the Benson Bros. of San Bernardino have done well. They went to the camp a few months ago and have sold \$20,000 worth of gold already, and find their claim steadily getting richer. A. Johnson and his partner are also doing well at Goler. On one day of last week ten ounces of gold were cleaned up from his claim. Summit camp is east from Goler, and from there also good reports come. A miner named Van Slyke is working there with two partners. A person who was at the camp recently states that he saw the three men take out \$180 in three days. A part of this claim is leased to Bakersfield men, and in one day they were seen to take out eight ounces. Mr. Van Slyke reports that the miners at Summit are averaging \$10 each a day. It appears settled beyond question that these three camps are but parts of a very extensive and wonderfully rich gold field. When the water is brought to the district from Owens river by the canal now being constructed, it is probable that the output will be something astounding, for now but a portion of the gold—the very coarsest—can be got by dry washing."

Nevada.

THE GRANITE HILL.—*Telegraph*, Jan. 31: The Granite Hill Mining Company is operating in Wolf creek, just below Boston ravine. Recently 237 pounds of ore from the mine were shipped to the Selby smelting works in San Francisco, and the result was that the company has received a check for \$50.70. The ore shown to-day was of much better quality than that shipped. The mine is looking well and when the company gets through the granite they expect something very rich. Ore will be assorted and shipped to the Selby works as often as possible. The Granite Hill has plenty of water power at a very low figure.

MINNE BONDED.—*Telegraph*, Jan. 31: Last week the Sebastopol mine, located in South Grass Valley, was bonded to E. H. Baxter and others of San Francisco, and Ben F. Runnels of this place. Active work will be commenced upon this valuable property on or before the first of May. The company proposes to erect machinery and to sink a new incline shaft to the depth of 300 feet.

ANOTHER MINE BONDED.—*Transcript*: J. J. Meacham has bonded his quartz mine on Piety Hill to a company that is now running a tunnel from the Weiss fish pond into the hill. Up to this time upward of \$15,000 has been taken from the mine above water level. The present company is pushing the work of development and it is believed a big property will be opened up there.

A GOON LEDGE.—*Grass Valley Union*, Feb. 1: There has been a decided change in the appear-

ance of the ledge at the St. John mine for the better during the past two weeks. Some of the quartz was brought to town yesterday and was pronounced by competent miners to be good milling ore. It is identical in character with that of the Idaho mine in the 400 level, and as in that mine at the same depth the ledge is very large, averaging about six feet. The ledge is encased between two beautiful walls, and is being drifted on in the 500 level.

JACK RABBIT TO START.—*Telegraph*: Superintendent Steinger of the Jack Rabbit mine informs us that he has a letter from the company's headquarters, to the effect that work would be resumed upon the property as soon as the roads were in condition to admit of hauling. The company propose sinking a new shaft and will also place new machinery on the property. The machinery will be run by water power. The Jack Rabbit is situated near the Buena Vista slide and no avoidable delay will be made in starting the work.

NEW SOURCE FOR WATER.—The Nevada City Transcript is informed that the Providence Mining Company has in contemplation a project for obtaining their water power from the South Yuba Company's ditch at Town Talk. The water will be conveyed by ditch and boxes part of the way, and then by pipe direct to the mine. By this arrangement a greater pressure can be obtained than at present, and the power can be distributed to better advantage. Besides this, there are other important advantages to be gained by making the change.

The Providence mine is looking better than for years, in fact it never looked better, and handsome cleanups are being made right along. The present company are working the mine systematically, and the good results of the development work done thus far are very flattering indeed. A rich and extensive shoot of ore has been found in the old Williams ground, from which quartz enough can be taken to keep the 40-stamp mill running steadily for a long time to come. This ledge is not the one now in dispute between the Champaign and Providence Companies, and in the event of a decision adverse to the latter company in the suit pending in the U. S. Circuit Court, it will not seriously interfere with operations in the mine. The Providence has a new lease of life, and there is every indication of a bright future for the old mine.

Sacramento.

CLAIMS TO HAVE A BONANZA.—The Bee's Folsom correspondent sends the following: David Blower, a rancher who resides about two miles from Folsom, came into town to-day and displayed samples of wonderfully rich gold-bearing cement and lava. He claims to have discovered a bank of rich deposit which extends ten feet in height and assays the same throughout. The samples really sparkle with gold. Rough estimates place the value of the cement all the way from \$40 to \$1000 a ton.

The deposit was found on the land of John Cardwell, which is protected by an agricultural patent and can be mined only by the owner.

Shasta.

A SALE.—*Democrat*: Barney Conroy has sold the Flat Creek quartz mine, formerly known as the Murray-Conroy mine, to Messrs. Hockett and Anderson for \$6500. Upon passing of deed, \$1100 was paid down and the balance will be paid in quarterly payments. This is a fine piece of mining property. The vein is small, but the ore is exceptionally high grade. The new owners will, in a few months, have a five-stamp mill in operation on the property.

Siskiyou.

VERY HIGH WATER.—*Yreka Journal*: The river miners on the Klamath are already making calculations for extensive operations next spring and summer, the exceedingly high water this winter cleaning out the stream in good shape for getting down to bedrock easier when the stream reaches the low-water mark.

There is about six feet of snow at the Boyle quartz mine, on the head of the north fork of Humboldt creek, and proportionately less all the way down to main creek, where there is but a few inches. This deep snow, high up on the mountain, with the ground thoroughly soaked from the heavy rainstorm, has compelled most of the companies working claims to shut down temporarily, on account of too much water in the shafts and tunnels. The snow and abundance of water, however, is much better for future success than a scarcity of water.

There is about 2½ feet of snow on the Deadwood mountain road at head of Greenhorn, with still greater quantity on the higher points, which will prove a good fountain in supplying water for ground sluicing on Cherry creek and also for quartz mining on Greenhorn and McAdams creeks.

Trinity.

MEN SCARCE.—*Journal*, Feb. 3: F. P. King has received a contract from the La Grange Hydraulic Gold Mining Co. to cover and line a portion of their new ditch and to keep it in repair for fifteen months. He has been employing all the men he could get during the last few days and there is no excuse for a man to be idle who is willing to work. Up to this time Mr. King has been unable to get what men he needed.

NEVADA.

Washoe District.

FOR AIA AND EXIT PURPOSES.—*Virginia Chronicle*: The Consolidated California & Virginia Company has begun opening the 1000 level north drift in the Best & Belcher from the Bonner shaft. This drift is some distance west of the course of the 1000 level southwest (Rule) drift from the Consolidated Virginia shaft, and when the former is reopened to the Best & Belcher north boundary line it will be extended in a northeasterly direction to connect with the Rule drift.

This work is for the double purpose of making an air connection and to provide an outlet for the underground employees of both mines in

case of an accident barring their exit to the surface through either the Consolidated Virginia or Bonner shaft. Since the Gould & Curry disaster, in which 11 men lost their lives through the lack of such an outlet, the management of Comstock mine have made connections with the underground workings of adjoining properties to provide more than one exit for miners to prevent the recurrence of such a calamity.

SUMMARY OF COMSTOCK OPERATIONS.—Following is a synopsis of the weekly reports from the Comstock mines for the week ending Feb. 3:

Consolidated California and Virginia, 1650 level.—In our workings in and from the drift run north from the foot of the upraise which was carried up from the sill floor of this level we have extracted a few tons of ore of average assay value. The drift running from east crosscut 1 from the drift run north from the winze (down 52 feet), at a point 40 feet north from the winze, has been advanced 13 feet; total length, 198 feet; face carries narrow streaks, from which we have extracted a few tons of ore of milling value. East crosscut 2 from the drift run north from the winze (down 25 feet), at a point 126 feet north from the winze, has been advanced 52 feet; total length, 97 feet; formation consists of porphyry, clay and quartz of low assay values. Total quantity of ore extracted from the mine during the week was 75 carloads, about 74 tons, averaging \$27.28 per ton. The largest portion of this ore came from our workings in the vicinity of the winze (20 feet down). The southwest drift (the Rule drift) from the 1000 station of the Con. Virginia shaft, has been advanced during the week 65 feet; total length, 518 feet; face in porphyry, clay and quartz of nominal value. This drift has been run from the shaft toward its objective point without any deviation from the original line which was laid down, and we have continued the work of reopening and extending a drift from the Best & Belcher side, which will meet the Rule drift at that objective point—a connection which will ventilate the workings and facilitate future operations in that locality.

Ophir—1465 level.—The drift running north from the crosscut running west from the main north drift on the sill floor of this level, at a point 124 feet south from winze station, has been extended 18 feet; total length, 107 feet; face in porphyry and clay separations. An advance of 100 feet has been made during the week in reopening and retimbering the central tunnel, making the total length of the drift reopened from its mouth 445 feet. Have continued (jointly with the Mexican Company) the work of making repairs to the main shaft.

Mexican—1465 level.—The crosscut running west from the drift run south from the top of the upraise which was carried up 45 feet above the sill floor of this level, at a point 40 feet west from the main north drift and 100 feet north from the south line of the mine, has been extended during the week 20 feet; total length, 180 feet; face in porphyry carrying clay separations.

Union mine—900 level.—The Union Con. and Sierra Nevada joint east crosscut near the north line of the Union mine, started from the joint south drift which was run from the joint west drift at a point 150 feet west of the shaft, has been extended during the week 25 feet, passing through hard porphyry. It is now entering softer ground.

Andes—420 level.—North drift from west crosscut 2 advanced 5 feet in low-grade quartz and stopped; total length, 37 feet. South drift from west crosscut 2 extended 14 feet in quartz of low grade and discontinued. A new crosscut will be started the coming week.

Best & Belcher—200 level.—East crosscut 4 started in northwest drift 170 feet from our north boundary has been extended 13 feet and discontinued with face in hard porphyry; total length, 28 feet. 900 level.—The east crosscut which is being run on our south boundary has been advanced 12 feet; total length, 314 feet; face in hard porphyry. 1000 level.—We have cleaned and repaired for a distance of 14 feet the northeast drift which has been run from a point in our main north drift, 100 feet from our north boundary. This work is being carried on jointly by the Con. Virginia company and this company for the purpose of making connection with the Rule drift. This connection when made will afford a means of escape in case of accident in this part of the mine and give also a better ventilation. We have also done considerable repairing throughout the mine during the week.

Gould & Curry—200 level.—West crosscut started in northwest drift has been advanced 11 feet; total length, 872 feet; face in hard porphyry.

Hale & Norcross—1300 level.—We continue stoping out ore from the winze below this level and extracted during the week six cars of ore assaying \$29.35 per ton per car sample and 21 cars of ore at an average assay per car sample of \$21.65 per ton.

Alta.—During the past week we have made connection with the Lady Washington shaft. The drift is now in good condition and the ventilation perfect. We started an upraise this morning at a point 400 feet north of our south line and near the center of our ground. The material is soft quartz and yielding low assays. Nothing has been done in the winze since the 29th prox., owing to a flow of water from the north drift, which ran down and interfered with the work. In the meantime have started stoping above the drift on a small streak of ore which may lead to something better.

OREGON.

THE MAROTTA MINE.—*Baker City Democrat*: The Eastern Oregon Mining Company of Detroit, Mich., with Mr. John Thomas of this city manager, is making arrangements for extensive mining operations the coming season. The property of the company is the Marotte mine,

near Sparta. Last fall, Mr. Thomas went to Ruthburg, Idaho, and purchased for his company a ten-stamp mill from Mr. James Ruth and had the plant transplanted to the mill-site selected at the Marotte mine. There is also on the ground 60,000 feet of lumber for mill-building purposes, buildings, etc., and not later than March 1st next the erection of the mill will be commenced.

BONNET A MILL.—*Jacksonville Times*: The company interested in the Mountain Lion group of mines in the Missouri Flat district have purchased a five-stamp mill with concentrator, which will be shipped in a few days. The prospects for a paying property are very encouraging.

SOLD PLACER MINE.—Judge Fullerton and John Rast have sold the Steam Beer placer mines, located in Grave Creek district, to Elvin Nicodemus of Chicago, and the consideration was \$6000. These mines have been worked for several years past, under the management of Frank Oggier, and have yielded a good income, says the *Roseburg Review*. The property comprises about 160 acres of placer ground, adjoining the mines owned by the Taylor Company. The new owner has taken possession, and will work the mines on a much larger scale than heretofore.

UTAH.

TO THE EDITOR:—There is considerable excitement now, and has been for two months, at the mouth of Bingham canyon, over some very rich placers. Some four months ago George Leroy, an old miner and prospector, who has been in most of the mining camps in the West, came here, and, after looking around for a week or so, discovered rich placers at the mouth of Bingham canyon, where people had been traveling over for the past 30 years. The ground pays to the depth of 85 feet (no bedrock yet), and averages 80 cents per cubic yard. The gold is middling coarse, considerable being flaky. The bars are all good pay, and the hills will all pay on each side of the creek. Claims are all taken for miles down the creek. A company has been incorporated, composed of Salt Lake capitalists, under the name of the Jordan Valley Placer Mining Company. They have 480 acres, and are now bringing in a ditch five feet wide and two feet deep from Bingham creek. They are making preparations to commence hydraulic mining as soon as the snow begins to melt, and expect about 1000 inches for three months. They have also commenced an open cut and flume, five miles below, so as to be able to work both sides of the creek.

AUGUST JOHNSON.

Bingham Canyon, Jan. 16, 1894.

NEW MEXICO.

HUNTING FOR GOLD.—A dispatch from Albuquerque says: "Mining is active all over the Territory, and, since the low price of silver, rich gold strikes are being recorded in every camp almost daily. The Territory never has enjoyed a better mining boom than now. A few days ago C. T. Brown and others purchased the Queen of the Valley mine, in Water canyon, Socorro county, and the report reaches here that they struck a vein of free-milling ore that runs high in gold, and in consequence a number of locations have been made in the canyon. Great excitement prevails at Socorro over the strike. A short time ago a party of Albuquerquians located several mines near the Cochiti Indian village and commenced active work. They made several good strikes and attracted the attention of Col. T. B. Mills of Las Vegas, who visited the camp with J. T. Dongine, a pioneer miner of Nevada, and who represented that State in the Department of Mines and Mining at the World's Fair. After examining the ore and formation, Mr. Dongine stated that there was gold in any quantities in the district, and to-day word is received of a big strike in the North Star mine, the ore running at least \$3000 in gold to the ton. Wallace is the nearest railroad station, and advices from there state that a number of parties are outfitting to go to the camp. Captain Frank Pagaly and others of this city have extensions to the North Star, and they are enthusiastic over the reports."

IDAHO.

A \$65,000 MINING DEAL.—*Boise Statesman*: Dan Peonar has sold to the Trade Dollar Mining Company of Silver City his group of mines adjoining the company's property, comprising the Sierra Nevada, Standard and Colorado, the consideration being \$65,000. All the mines of the group are old-time properties. The Sierra Nevada and Standard are gold mines and the Colorado is a gold and silver mine. All the ledges are large and the ore assays well. It is estimated that at least \$300,000 has been taken from the Sierra Nevada alone. The ruins are nestled among a number of splendid properties. They are extensions of the Trade Dollar and Black Jack, the great value of which has already been established, while to the west are the Alpine and Little Chief.

TO START UP THE POORMAN MILL.—*Idaho Avalanche*, Jan. 27: Superintendent Shanks received a cablegram last week from Managing Director J. C. Kemp van Ee, to start the mill as early as practicable. We visited the property last Tuesday and found workmen busily engaged in carrying out the instructions. The two 6-foot Frue vanners received last fall were being placed in position and necessary changes made in the mill for the new machinery. An abundant supply of water is available for milling purposes, and ore hauling will be commenced soon. Within a week or ten days the welcome toot of the mill whistle will be heard. There are now some 300 tons of ore in the ore house at No. 3, considerable stored in unused crosscuts in the mine, and that on the Belle Peck dump. As soon as hauling commences, a force of miners will be put in the stopes. Timbers and supplies of every kind are now at the mine. The crosscut from the Belle Peck to the Oso is progressing steadily.

Electricity.

Transmission of Power.

The predictions of electrical experts as to the transmissibility of electric currents for lighting and power purposes have been received with the credence that the utterances of men who have accomplished things little short of the marvelous are entitled to, says the *Milwaukee Wisconsin*. But there is a difference between possibility and practicality, and unless it can be demonstrated that power can be carried to factories from dynamos at waterfalls more cheaply than it can be generated and applied with steam boilers and engines the calculations of those who have been figuring upon the utilization of the enormous amount of water power going to waste on unused streams will come to naught.

In a report from Chemnitz as to the result of experiments in the transmission of electrical currents from waterfalls in Switzerland Consul Monaghan shows that the cost of electrical power exceeds that of steam power. Steam power in Switzerland costs \$46.82 per horse power per annum for 50-horse power, \$29.61 for 300-horse power, and \$25.54 for 500-horse power. Electric power transmitted five kilometers, or 3.1068 miles in an air line, costs \$57.68 for 50-horse power, \$31.27 for 300-horse power, and \$24.48 for 500-horse power. This is a showing contrary to the calculations of people who have permitted their expectations to run wild.

Consul Monaghan says that Switzerland, with its freshets, its uncertain water supply and its electrical storms, is hardly the place for experiment in the transmission of electric power by wire from waterfalls, but the difficulties there encountered are likely to be met in varying degree wherever similar conditions exist.

The result of the experiments in Switzerland will be of value to electrical engineers in this country, who are measuring probable cost as they proceed. It is only the dabbles in the electrical science who can already see a network of wires running over the United States from centers of energy at waterfalls.

Operating Lock Gates Electrically.

The *Engineering Record* of November 18th has a communication, in which this system is proposed by Thomas Munro, M. Inst. C. E., superintendent of the Soulanges Canal in the Province of Quebec. Mr. Munro writes that an electric motor transmits power through a train of gears to a pinion which works into a rack placed on the side of a six-inch I beam. The end of this beam is attached to the top of a lock-gate, which it pushes shut or pulls open as may be required. The operation takes about 55 seconds, and is performed with perfect ease. It is proposed to operate two pairs of gates and four filling and emptying sluices from one point in the center of the lock and upon whichever side may appear advisable. The experiments are not yet completed, and Mr. Munro expects that the apparatus will be much simplified before being used on the canal.

Temperature by Photography.

The temperature of the blast furnaces at the Royal Mint is now recorded by means of photography. A thermo-electric pyrometer is employed, the shot of light from the mirror being received on a revolving drum covered with sensitive paper. The curves thus produced give a record of the variations in the temperature of blast, and by watching these curves, it is said that a greater regularity of work is obtained.

Metal from Pulp.

There has just been built in the factory of the W. S. Hill Electric Company, Boston, a piece of electrical apparatus which is both

novel and efficient. It was designed by Prof. Carmichael of the Massachusetts Institute of Technology, and perfected by W. S. Hill. The purpose for which this device has been built is by the use of magnets to extract every particle of metal from pulp which is used in the manufacture of paper, which has proven to be a great hindrance both in the manufacturing and using of papers.

Diamonds in Electric Arc.

M. Moison, a French electrician, who had been experimenting with diamonds in the electric arc, says: By starting the arc slowly and placing a diamond in the crater, it is brought to incandescence and increases in size, covering itself with a black mass formed entirely of graphite. When the diamond is placed in an electric furnace it breaks into small fragments, each of which is changed into graphite; the stable form of carbon at the temperature of the arc is therefore graphite. In an oxy-hydrogen lamp at a temperature of 2000 degrees, a diamond was covered with a black coating, but he never obtained any graphite.

Singular Origin of Fire.

A Connecticut paper mentions the peculiar origin of a fire which occurred recently in a dwelling house in Norwalk. An electric railway passes the place, and it appears that the return current, some of which escapes from the rails into the ground, followed an iron water pipe into the cellar of the house, then switched off to a gas pipe at a point where the two came in contact, and followed the latter to the meter, where it melted the lead connection and ignited the gas. The flames had caught the floor timbers when they were discovered, but the fire was extinguished with but trifling damage.

Electricity and Tricycles.

There was some talk here, says *Invention*, a little while ago of electrically propelled tricycles superseding the use of cars, and some such idea seems now to have reached Italy, where, it is reported, experiments are now being made with light electric vehicles somewhat larger than ordinary tricycles, the vehicle being equipped with a battery of ten cells, capable of yielding sufficient energy to propel them for from three to five hours. We shall be interested to learn the result of these experiments.

To Stop Runaways.

A scheme to prevent runaways is to have a small electric battery in the vehicle with wires running to the horses' nostrils. When the animal bolts a press of the button will stop him instantly. It is said to have never failed.

Trolley Accidents.

The Supreme Court of Massachusetts has rendered a decision making electric street railway companies liable for damages in the case of street travelers who are injured by the falling of overhead wires connected with the railway.

In a Cold Cycle.

That the continent of Europe is passing through a cold period has been pointed out by M. Flammarion, the French astronomer. Says the *Scientific American* concerning the matter: During the past six years the mean temperature of Paris has been about two degrees below the normal, and Great Britain, Belgium, Spain, Italy, Austria and Germany have also been growing cold. The change seems to have been in progress in France for a long time, the growth of the vine having been forced far southward since the 13th century, and a similar cooling has been observed as far away as Rio de Janeiro, where the annual temperature has been going down for some years past.



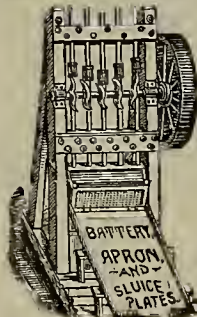
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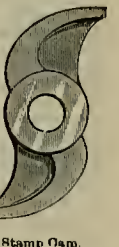
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Market Reports.

The Markets.

SAN FRANCISCO, Feb. 8, 1894.

The London silver quotation of 29 1/2 pence to day was the lowest ever officially recorded. A sale was reported as low as 30d in June, 1893. The New York price yesterday was 64 1/2c, or 2 1/2c above the lowest on record, in June, 1893. That the latter market has not declined to the same extent as London is due to the fact of its not being so well stocked with silver. The heaviest losses have fallen on the London dealers, who had been accumulating bars at Indian ports in anticipation of an import duty.

Dun's Review of January 27th, commenting on the silver situation, says: All the markets for commercial bar silver were in a semi-demoralized condition, the range of prices for the week being very wide. The disturbance began on Saturday, when the news of the abandonment of the Indian import duty proposition was followed by the announcement that the Indian office in London would not maintain its minimum rate for sale of council bills at 15 1/2d the rupee, but would consider lower bids. For two days it was feared that the plan was to sell bills for whatever they would bring, and consequently there was little or no market for silver. On Wednesday tenders for 50 lakhs of rupees in Indian council drafts were invited, but the original bids of 15 1/2d @ 15 1/2d were declined. Later 25,000 were sold at 15 1/2d @ 15 1/2d @ 15 1/2d, and the silver market thereupon recovered a little on the theory that the worst was known. Purchases, however, were mostly speculative, and the temper of the market was bearish. The effect of the action of the Indian office will be to bring council bills into competition with silver in eastern settlements, with the probable results of depressing silver and stimulating India's export trade.

Mint Coinage for January.

The foreman of the coinage department of the United States branch Mint in this city reports the coinage for January as follows:

Descriptions.	Amount.
Double eagles.....	\$2,320,000
Half dollars.....	220,000
Quarter dollars.....	20,000
Total.....	\$2,560,000

The coinage for the first seven months of the fiscal year beginning July 1, 1893, as compared with the corresponding period of 1892, makes the following showing:

	1892-93.	1893-94.
Double eagles.....	\$12,860,000	\$12,323,500
Eagles.....	228,500	228,500
Half eagles.....	415,500	288,000
Standard dollars.....	700,000	700,000
Half dollars.....	198,720	590,000
Quarter dollars.....	110,000	248,200
Dimes.....	22,901	149,140

NEW YORK, Feb. 8.—Following are the closing prices for the week:

	Silver in	Copper.	Lead.	Tin.
Thursday.....	30 1/2	66 1/2	9 90	3 20
Friday.....	30 1/2	66 1/2	9 95	3 20
Saturday.....	30 1/2	66	9 87 1/2	3 25
Monday.....	30 1/2	65 1/2	9 87 1/2	3 25
Tuesday.....	30	64 1/2	9 75	3 25
Wednesday.....	29 3/4	64 1/2	9 75	3 25

San Francisco Metal and Coal Market.

Per lb.	QUICKSILVER.	Home trade, pr.	STEEL.
Refined, in car lots.....	77	30 00	—
Powdered, do.....	77	—	20
Concentrated, do.....	77	—	20
All grades, in car lots.....	77	—	20
COFFEE.			
Bolt.....	23	—	4
Obsolescent.....	23	—	4
Unsold.....	23	—	4
Do, whole sale.....	15	—	22
IRON.			
Bar, base.....	23	—	22
Norway, base.....	23	—	22
PIG IRON.			
Eglington.....	18	50	—
Oleander.....	18	50	—
Am. Soft, No. 1.....	18	50	—
Shott's No. 1.....	18	50	—
Puget Sound.....	18	50	—
Fly Ash White.....	18	50	—
Langdon.....	22	50	—
Carthage.....	22	50	—
Barrow.....	22	50	—
Cargolite.....	22	50	—
LEAD.			
Pig.....	—	—	—
Bar.....	—	—	—
Sheet.....	—	—	—
Pipe.....	—	—	—
Drop, sizes smaller than	—	—	—
Do, bag of 25 lbs.....	—	—	—
Do, bag of 25 lbs.....	—	—	—
Back, Balls and Chilled	—	—	—
do, bag of 25 lbs.....	—	—	—

Board Sales of Mining Stocks.

S. F. Stock Board.

THURSDAY, February 8, 1894.

9:30 A. M. SESSION.

300 Belcher.....	85c	100 Mexican.....	1.25
500 Benton.....	60c	500 Ophir.....	1.25
500 Challenge.....	40c	500 Ophir.....	1.25
500 Con. Cal. & Va.....	3.10	100 Potomac.....	.70c
150 Confidence.....	1.30	100 Savage.....	.70c
500 Crown Point.....	85c	200 Sierra Nevada.....	.90c
200 O & C.....	.75c	200 Yellow Jacket.....	.90c
100.....	.75c		
2:30 P. M. SESSION.			
300 Belcher.....	85c	100 Mexican.....	1.25
400 Bullion.....	20c	200 Ophir.....	1.25
100 Bullion.....	15c	200 Ophir.....	1.25
400 C. & Va.....	3.15	100 Overman.....	.20c
100 Crown Point.....	85c	500 Potomac.....	.70c
200 H & N.....	.65c	100 S. & M.....	.70c
100 Justice.....	.5c	50 Union.....	.90c
200 Mexican.....	1.20	200 Yellow Jacket.....	.90c

—In the legislature at Victoria, B. C., Tuesday, a resolution was adopted unanimously to have the duty modified on rubber goods, agricultural implements and machinery, mining appliances and other goods not manufactured in the province.

Mining Share Market.

SAN FRANCISCO, Feb. 8, 1894.

There has been some activity in the Comstock market during the week. The leading stocks of the north end, middle and Gold Hill, were in steady demand by the principal brokers in both boardrooms and most of the offerings appeared to come from short sellers. A large short interest is always beneficial to a strengthening market.

In the Comstock mines the prospecting work recently started is going ahead with vigor. Should there be improvement at any point more men will be added to the working forces.

Eleven miners have been added to Best & Belcher force of underground employes for the purpose of reopening the old north drift on the 1,000 level in connection with the Rule drift being advanced from the Consolidated Virginia shaft.

The following financial statements show the conditions of the different companies on February 1st, without the expenses for January having been paid:

	DR.	CR.
Bodie.....		\$6,942 05
Bulwer.....	\$4,004 18	
Monro.....		4,201 40
Standard.....		33,653 61

TUSCARORA MINES.

Belle Isle.....	177 73
Navajo.....	256 36
Nevada Queen.....	2,157 00
North Belle Isle.....	1,059 52
North Commonwealth.....	794 38

COMSTOCK MINES.

Alpha.....	3,189 39
Alta.....	1,384 52
Andes.....	1,282 86
Belcher.....	7,401 32
Best & Belcher.....	15,478 16
Bullion.....	3,190 00
Caledonia.....	7,156 31
Challenge.....	1,302 07
Chollar.....	9,743 40
Confidence.....	6,395 44
Con. Imperial.....	837 33
Con. Cal. & Va.....	15,138 03
Con. New York.....	3,402 35
Crown Point.....	14,273 04
Exchequer.....	3,081 73
Gould & Curry.....	2,260 36
Hale & Norcross.....	16,755 34
Justice.....	389 88
Kentuck.....	1,995 95
Lady Washington.....	835 14
Mexican.....	22,300 66
Ophir.....	2 339 20
Occidental.....	21 39
Overman.....	895 85
Potosi.....	6,701 41
Savage.....	13,003 38
Scorpion.....	14 84
Seg. Belcher.....	1,247 80
Sierra Nevada.....	3,668 68
Silver Hill.....	526 17
Union.....	14,930 73
Utah.....	1,766 33

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR WEEK ENDING JAN. 30, 1894.
513,629—CHECK FOR HORSES—W. C. H. Amundsen, San Diego, Cal.
513,749—TICKET HOLDER—F. D. Atherton, S. F.
513,475—FAUCET—M. L. Bergman, Spokane, Wash.
513,704—RAIMON-SHEDDER—S. B. Hies, Riverside, Cal.
518,900—WIRE TIGHTENER—W. B. Flaiding, San Jose, Cal.
513,910—STORAGE BATTERY—O. B. Fralery, S. F.
513,905—TRAP—Hubbard & Judkins, Los Angeles, Cal.
513,776—BLANK FREDER—Oray & Murch, S. F.
513,778—WIRE-STRUTTER—J. H. Gregory, Ione, Cal.
513,923—EXHAUST NOZZLE—E. W. Harris, Palmdale, Nev.
513,909—SPONGE WORKING MACHINE—S. Heron, Los Angeles, Cal.
513,780—HOP TRAILER—E. C. Horst, Sacramento, Cal.
513,930—WAVE POWER—Husted & Doolittle, Los Angeles, Cal.
513,790—CIRCUIT CLOSER—H. Lewis, Carson, Nev.
513,715—GATE—B. O. McCoy, Sulphur, Cal.
513,811—FLOW-SHAFTER—S. S. Morrill, Stockton, Cal.
513,690—SPRING GUN—W. B. Morris, Seattle, Wash.
513,813—SHINING-BINDER—Munro, Hart & Baty, Sedro, Wash.
513,718—BATHING BRUSH—F. Neidl, S. F.
513,694—WRENCH—W. A. Papou, Baker City, Or.
513,634—TELEPHONE SIGNAL—Sahlin & Hampton, S. F.
513,737—POWER—E. A. Starks, S. F.
513,849—CONCENTRATOR—G. W. Walt, S. F.
23,019—SPONGE DESIGN—A. Kaiser, Stockton, Cal.

NOTE.—Copies of U. S. and Foreign patents furnished by Dewey & Co. in the shortest time possible (by mail or telegraphic order). American and Foreign patents obtained, and general patent business for Pacific Coast Inventors transacted with perfect security, at reasonable rates, and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

SMOKELESS POWDER.—E. A. Starke, San Francisco, Cal. Assignor to the U. S. Smokeless Powder Co. No. 513,737. Dated Jan. 30, 1894. This invention relates to an improved explosive compound which is especially designed for use in guns and other weapons in which it is desirable to produce the maximum effect without the production of large quantities of smoke and fumes. It consists of an improved compound of materials which will produce this result.

BATHING OR FLESH BRUSH.—Frank Neidl, San Francisco, Cal. Assignor to P. H. & F. Buchanan. No. 513,718. Dated Jan. 30, 1894. The object of this invention is to provide a brush with attachments by which the brush may be raised, lowered and otherwise adjusted so as to be applied to the surface of the body at different parts, and to so construct and arrange the brush that water may be applied, and

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ASSESSMENTS.

COMPANY AND LOCATION.	NO.	AMT.	LEVIED,	DELINQ	TAX	SALE.	SECRETARY.
Alpha Cons M & M Co, Nev.....	12	100	Jan 18, Feb 21, Mar 20				Obas E Elliot, Nevada Block
Alta S M Co, Nevada.....	45	100	Jan 25, Feb 28, March 21				J E Jacobus, Nevada Block
Bull on M Co, Nevada.....	45	100	Jan 25, Feb 28, March 21				J E Jacobus, Nevada Block
Obhar M Co, Nevada.....	37	100	Dec 11, Jan 15, Feb 6				Obas E Elliot, 303 Montgomery
Conlon G M Co, Cal.....	1	50	Jan 11, Feb 18, Mar 7				Thos Lynch, 26 Montomery
Confidence S M Co, Nevada.....	24	250	Dec 24, Jan 30, Feb 20				A S Grob, 414 California
Corona Pail G & S M Co, Nevada.....	63	250	Dec 12, Jan 16, Feb 6				Jas Newlands, Mills Building
Dora G M Co, Cal.....	2	50	Dec 27, Jan 27, Feb 27				Julius Blumenthal, 415 Montgomery
Ea L Best & Belcher S M Co, Nev.....	4	200	Jan 25, Feb 26, Mar 13				O H Mason, 321 Montgomery
East Sierra Nevada M Co, Nevada.....	3	50	Jan 10, Feb 23, March 16				Geo R Ophney, 310 Pine
Elipio M Co, Cal.....	6	50	Dec 19, Jan 20, Feb 6				Otto tum Sudea, 216 Bush
Elipio M Co, Cal.....	5	100	Jan 25, Mar 1, Mar 19				J J Scoville, 30 Sansome
Evening Star M Co, Cal.....	12	100	Jan 11, Feb 23, Mar 16				Jabez Howes, 214 Pine
Gray Eagle M Co, Cal.....	35	300	Jan 10, Feb 19, Mar 19				A K J Scoville, 30 Sansome
Gould & Curry S M Co, Nev.....	73	150	Jan 31, Mar 5, Mar 29				A K Durbrow, Nev Block
Gover M Co, Cal.....	4	250	Dec 20, Feb 1, Feb 28				Robert M J. Doble, Mills Building
Gray Eagle M Co, Cal.....	35	300	Jan 10, Feb 19, Mar 19				Obas E Elliot, Nevada Block
Iowa M Co, Nev.....	10	50	Jan 24, Feb 28, Mar 19				H L Thomas, 415 California
Kentuck Cons M Co, Nevada.....	8	100	Dec 21, Jan 24, Feb 15				Aug Waterman, Nevada Block
Martha White M Co, Nev.....	29	250	Jan 13, Feb 24, Mar 31				K L Ross, Sup Court Bldg
McDon S M Co, Nevada.....	49	250	Dec 16, Jan 19, Feb 13				Obas E Elliot, Nevada Block
Occidental Cons M Co, Nev.....	15	100	Jan 15, Feb 18, Mar 14				A K Durbrow, Nevada Block
Ophir S M Co, Nevada.....	61	250	Dec 20, Jan 23, Feb 12				E B Holmes, Nevada Block
Ophir Hill M Co, Cal.....	1	250	Jan 17, Feb 23, Mar 12				R R Orayson, 331 Pine
Pear M Co, Ariz.....	16	50	Jan 24, Mar 5, Mar 26				Aug Waterman, Nev Block
Potosi M Co, Ariz.....	21	60	Jan 15, Feb 18, Mar 14				Aug Waterman, Nev Block
Pine Hill G & S M Co, California.....	3	50	Jan 6, Feb 13, Mar 13				Chas A Hare, Plot 5, Stewart St
Saton G M Co, Cal.....	8	200	Jan 26, Mar 7, Mar 27				Chas T Bridge, 224 California
Seg Belcher & Milder Cons M Co, Nevada.....	13	100	Feb 5, March 9, March 29				E B Holmes, Nevada Block
Sierra Nevada S M Co, Nev.....	100	250	Jan 11, Feb 20, Mar 12				E L Parker, Nev Block
South Fork M Co, California.....	8	100	Dec 13, Jan 22, Feb 16				A Halsey, 328 Montgomery

MEETINGS

COMPANY AND LOCATION.	MEETING.	SECRETARY AND OFFICE IN S. F.	DATE.
Orrara Marble Quarry Co, California.....	Annual.....	O Dondoro, 1213 Market.....	Feb 12
Nature Water and M Co, California.....	Annual.....	D H Hays, 638 California.....	Feb 12
Standard Cons M Co, California.....	Annual.....	J W Pew, 310 Pine.....	Feb 19
Watt Blue Oravel M Co, California.....	Annual.....	G A Bertson, 323 Montgomery.....	Feb 19

in conjunction therewith an electrical current which may be applied either with or without the use of water. This device may be used as an attachment to a bath tub, shower, or other suitable or convenient appliance for bathing purposes.

STORAGE BATTERY.—George B. Fralery, San Francisco, Cal. Assignor to John L. Eckley. No. 513,910. Dated Jan. 30, 1894. In the ordinary construction of storage batteries, the substance which serves for the storage of electrical energy is contained in open spaces made in flat leaden plates which are afterward secured together in series. It is difficult to retain the filling in the spaces in these flat plates and if the battery be overcharged, the plates will be hooked and twisted out of shape. The object of this invention is to provide an improvement in this class of batteries which will render the elements capable of retaining the filling material in place, and of resisting any tendency to buckle or warp out of shape. It consists of a series of concentric cylindrical perforated tubular elements with an active filling material placed within and between the elements and a means for exciting the same.

BLANK FEEDING DEVICE.—J. A. Gray and J. H. Murch. Assignors to Robert D. Home, Gold Beach, Or. No. 513,776. Dated Jan. 30, 1894. This invention relates to an apparatus for feeding blanks or pieces of any description, such as metallic disks, can heads, sheets of metal which are to be used for making cans, or cylindrical or globular objects, or for other purposes where the pieces are to be fed in succession singly. It consists of a lifter to which each article adheres, and a carrier to which the lifter is attached, mechanism by which the lifter is first depressed upon the article so that the article is caused to adhere to it, and means for lifting the carrier and the adhering article, and transferring them laterally to a point where the article is to be deposited, and in conjunction with this a means for disengaging the article when it arrives at the point where it is to be deposited or used.

Very Important to Gold Miners.

The exhibit at the Midwinter Fair of silver plated copper mining plates, for saving gold in quartz and placer mining, made by E. G. Dennison, proprietor of the San Francisco Plating Works, 653 and 655 Mission street, in this city, is the finest and most extensive exhibit ever made of gold-saving amalgam plates. Two of the plates are the largest ever made, 66" by 20", containing 55 square feet each; six other mining plates, 60" by 96", 40 square feet each, and several 48" by 96" plates, 32 square feet each, are included, making in all over 400 square feet of surface.

The silver plated plates in the three gold quartz mills of the Huntington, Risdon and Hendy exhibits were also furnished by Mr. Dennison, who is the pioneer manufacturer of these goods.

The Dennison silver plated mining plates are known as the best and are in use wherever there is gold mining.

Metal goods of every description are plated at his works, with gold, silver, nickel, brass, copper, etc. Twenty-five medals have been awarded to him for best gold, silver, nickel, etc., plating, and for the best silver plated mining plates.

Mr. Dennison has four separate exhibits in the Mechanical Arts building, and one in the Quartz Mill building, erected by the State Mining Association.

Assessment Notices.

GOULD & CURRY SILVER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Virginia, Storey County, Nevada.

Notice is hereby given that at a meeting of the Board of Trustees, held on the 31st day of January, 1894, an assessment (No. 73) of Fifteen (15) Cents per share was levied upon the capital stock of this corporation, payable immediately in United States gold coin to the Secretary, at the office of the Company, Room 69, Nevada Block, No. 309 Montgomery Street, San Francisco, California. Any stock upon which this assessment shall remain unpaid on the 8th day of March, 1894, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on THURSDAY, the 29th day of March, 1894, to pay this delinquent assessment, together with the costs of advertising and expenses of sale. By order of the Board of Trustees.

Office—Room 89, Nevada Block, No. 309 Montgomery Street, San Francisco, California.

Coast Industrial Notes.

—The quarrymen of Spokane, Wash., have formed a trust to secure better prices for their stone.

—The steamship Miowera was closely inspected at Esquimalt Tuesday morning, and it was found that 140 plates on her bottom will be ultimately necessary.

—Vallejo had bonfires, gun salutes, music, fireworks and bell-ringing Saturday night last. The completion of the water-works was the occasion of the noisy demonstration.

—The citizens of Oakland and Berkeley will not subscribe \$225,000 to the capital stock of the Oakland Terminal Company (opposition ferry). The whole scheme to raise the money is at an end, and F. M. Smith, who made the proposition to the citizens, has called in all his promises.

—The old and reputable commission firm of Scotchler & Gibbs has assigned for the benefit of creditors, with liabilities exceeding \$200,000, and by some estimated to approach \$250,000. This is one of the heaviest failures that the commercial world in San Francisco has known for a long time, and the high standing and reputation for prudence of the firm make the assignment more noticeable.

—A dispatch from New York says that the limit within which stock could be deposited in favor of the scheme of the reorganization committee of the Nicaragua Canal Construction Company has expired. Nearly 100,000 shares—considerably more than a majority—have been handed in, consequently the reorganization agreement becomes operative and goes into full effect.

—The formal transfer of Sacramento's immense street-car system took place February

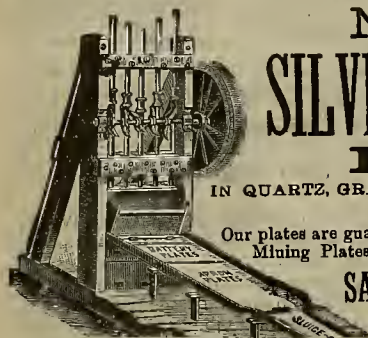
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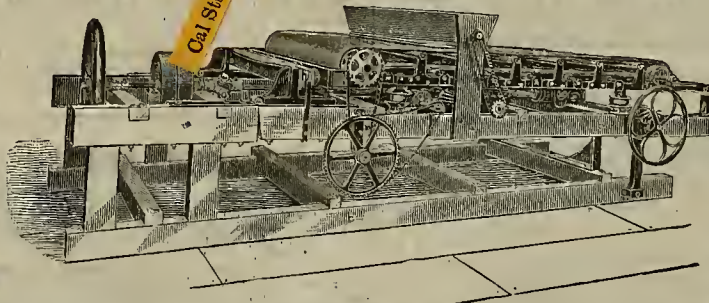
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FALLS MINE, IGO, SHASTA CO., CAL., May 25th, 1893.

THE MCGLEW CONCENTRATOR COMPANY: I take much pleasure in endorsing your very superior Ore Concentrator. When I was requested to examine your concentrator, I did so under protest, declaring that I would have none other than a Frue, as after many years experience with different concentrators, I believed them to be the best.

Now, after a thorough trial of the McGlew Ore Concentrator, on ores difficult of concentration, I emphatically pronounce it the best concentrator of any I have ever used in handling my ore. It is doing CLEANER and CLOSER work than I had believed possible for any concentrator to accomplish.

Samples of pulp and tailings, taken every hour, dried, mixed and assayed, show * * * from West ledge, a saving by your concentrator of 9 1/2 per cent; from East ledge, * * * a saving of 92 per cent.

The concentrator runs very easy and requires but slight attention. One man attends to rock-breaker, crusher and concentrator. You have a good concentrator, and it can be relied upon to handle any ore that will concentrate. I most heartily recommend it to the mining public. Yours respectfully,

E. L. BALLOU, Propr. Ballou Reduction Works.

MINE BELL SIGNALS

ADOPTED, USED AND IN FORCE IN ACCORDANCE WITH STATE LAW.

FOR THE CONVENIENCE OF OUR READERS IN THE MINING COUNTIES WE PRINT IN LEGAL SIZE, 12x36 INCHES, THE MINE BELL SIGNALS AND RULES provided for in the Voorhes Act, passed by the State Legislature and approved March 8, 1893. The law is entitled "An Act to Establish a Uniform System of Mine Bell Signals to Be Used in All Mines Operated in the State of California, for the Protection of Miners." We can furnish these Signals and Rules, printed on cloth, so as to withstand dampness, for 50 cents a copy.

MINING AND SCIENTIFIC PRESS, 220 Market St., San Francisco.

MINING AND SCIENTIFIC PRESS

An Illustrated Journal of Mining, Mechanics and Popular Science.

VOLUME LXVIII.
Number 7.

SAN FRANCISCO, SATURDAY, FEBRUARY 17, 1894.

Three Dollars per Annum.
SINGLE COPIES, 10 CENTS.

An Ocean Beach Mine.

A beach-sand mine of large dimensions is being worked at Gold Bluff, Humboldt county, and is said to be yielding to its owners very large profits. The surf of the ocean is a most important factor in the development of the property, for the reason that it is instrumental in renewing the auriferous sand, and carries away the gravel of the great bluff which terminates the beach. The sand is really the concentrates from the great gravel deposit which at this point forms the bluff. The deposit is evidently an ancient river channel that at one time probably formed the outlet of the Klamath river to the ocean. It presents a cross-section surface to the ocean of about six miles, and extends to eastward about eight miles. It has been prospected to a depth of 500 feet, but bedrock has not been reached. The gravel is clean and white, with small pebbles and no boulders. The gold is fine, but clear and easily recovered.

The method of working is unique. At the point where the sand is secured there is a sort of inlet from the ocean, a lagoon being formed behind the ocean beach. Between the two peninsulas of the lagoon which form part of its western boundaries is a bar which is constantly acted upon by the surf; and it is from this bar that the auriferous sand is taken. The sand is packed very solid. It is raised by means of an endless chain and buckets to a height where it can be handled, and is then amalgamated.

Mr. R. K. Chapman, now in this city, was for many years owner of the deposit. He says that he frequently secured \$1,000 per day from the sand. It will average from \$12 to \$15 in gold per ton. He sold out to Mr. Coffin, and associates, about a year ago. It is Mr. Chapman's opinion that the gravel will eventually be worked by the hydraulic process. It will be necessary, however, to bring water a distance of nearly fifty miles, and the cost will be very heavy. It can be made, he said, the most gigantic hydraulic mine in the world, for the deposit



IN THE SIERRA NEVADAS—LAKE SPAULDING.

is inexhaustible and the gold will average about 15 cents per cubic yard. The debris could easily be deposited in the ocean, where it would be carried off by the tides. In Mr. Chapman's opinion the gravel will undoubtedly be worked in this manner. Mr. Coffin's holdings aggregate about 2,000 acres.

TROUBLE is said to have arisen between James G. Rule

and the management of the Consolidated California and Virginia mine, relative to the terms of the contract by which he was to uncover an ore body on the 1100-foot level. The management, it is alleged, have greatly hampered Mr. Rule in his operations. They have refused to allow his personal expenses, or the selection of men under him. Besides all this, Mr. Rule has been much interfered with by illness. It must be admitted that unprejudiced mining men never had a great deal of confidence in Mr. Rule's ability to find a valuable deposit. Some persons are mean enough to say that the whole contract is simply another device to bull stocks. If so, it was certainly successful, for Consolidated California and Virginia went in a short time from \$1.25 to \$5.

A NEW REGULATION has been promulgated by the Southern Pacific Company in regard to the transportation of high explosives. The company will hereafter decline to carry black ignition powder, wood powder, dynamite, high explosive caps, or other high explosives of whatsoever kind or designation, unless the company is exempted from all damage to such freight; and further, that the company shall be indemnified against any loss or damage to person or property arising from the combustible or explosive character of said freight.

In the Sierra Nevada.

The two views on this page are a continuation of the series in last week's issue of the PRESS. They are types of the mountain scenery of the Sierra Nevada; and, besides, Lake Spaulding bears a very important relation to mining operations in Nevada and Placer counties. Besides being in itself an immense reservoir, it is a collecting basin for all the lakes above. The dam, shown last week, is a fine piece of engineering. Not one ounce of cement was used in its construction. It was built under the direction of John Spaulding, superintendent of the South Yuba Water Company.



IN THE SIERRA NEVADAS—ROAD TO BEAR VALLEY.

MINING AND SCIENTIFIC PRESS.

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Our latest forms go to press on Thursday evening.

Entered at the S. F. Postoffice as Second-Class Mail Matter.

San Francisco, February 17, 1894.

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The Treasury Department at Washington announces that the gold output for 1893 in the United States reached \$37,000,000, an increase over 1892 of \$4,000,000. In Colorado the output has increased from \$3,000,000 in 1892 to \$5,000,000 in 1893, while the gains in other gold-producing sections are unusually large.

MR. HENRY K. B. DAVIS, of Philadelphia, is the owner of a patent on a process for rapid chlorination of ores under pressure, also for rapid filtering of the pulp; in the former, he mixes the ore with his chlorine preparation and tightly closes the cask, and as the material generates the chlorine gas, it at the same time makes its own pressure. His patent for filtration is that of filtering through charcoal, the same time converting the gold from a chloride to a metallic and precipitating the same in the charcoal filter.

ONE or two Grass Valley papers complain that the patent system of ownership of mining claims is working real injury to the interests of Nevada county, inasmuch as the owners of prospects refuse to work them themselves and will not sell for less than a sum that is practically prohibitive. There are no doubt many cases where actual benefit would result if an owner did not have quite so secure a hold upon his idle property. But every man has a right to do what he will with his own. When he cannot, government ceases, and anarchy results. If it is not possible to obtain absolute title to mining ground, the industry would be destroyed, or, at best, it would be terribly crippled. Mossbacks afflict every country, Nevada among the rest. They never die. They are the brakes on the wheels of progress, and are useful in preventing runaways, even though they do sometimes stop the train.

VIOLATION of the mining laws has buried 13 men 600 feet under ground in the Gaylor mine at Plymouth, Pa. If they are alive they cannot be rescued for several days, but experienced men who have made a careful survey believe there is hardly one chance in a hundred that they still live. In mining coal in the vein, massive pillars of coal are left standing to support the roof, forming a natural colonnade along the main gangways and planes. When the vein begins to fail and good coal in that part of the mine is hard to get then the robbing of pillars commences. The mines do not generally cave in without a peculiar warning, which is well known to the men when working under ground. There are strange noises caused by the earth settling, and sometimes for days before the final fall pieces of coal and rock will drop from the ceilings and sides of the gangways. This is called "chipping" and indicates that a greater fall is coming, and the mine is said to be "working." This was the condition of the Gaylor mine for several days before the disaster.

No Jobbing of California Mines.

There is one feature of California gold mining which is in the highest degree creditable to the industry and to the men who are its chief promoters; and that is the almost total absence of stock jobbing and stock manipulation in connection with the mines. It is a fact that very few California mines are listed on the stock boards and that operations thereon are confined largely to the Comstock. It will be remembered that an effort was made last year to secure listing of California properties at the exchanges, and all charges to the mining companies were waived; but it ended in almost total failure. There are few or no fake companies in California, designed primarily to mine the pockets of the stockholders. Instances of fraud are becoming more infrequent year by year, until now, it is safe to say, illegitimate concerns are as rare in California gold mining as in any other industry.

The great curse of Colorado mining is the stock methods which prevail in all classes of mining. The universal method is to form a company and make its stock subject to public sale. In former years a common method of influencing the value of shares was to declare dividends which were never earned. No statement of assets and liabilities, receipts or expenditures is required by law to be published. A few years ago in Colorado an attempt was made to have an act passed compelling mining companies to make at least annual statements of their receipts and expenditures. The stockholders and all interested in mining stock companies were immediately arrayed against it. "It will ruin our business," said more than one. "It will stop mining stock company fakes," was the reply. "We are not guardians for the fools," came back the rejoinder from a member of the Legislature. "This fake dividend paying is no more than the railway and other great corporations do," openly declared one promoter, "and nobody says the great railway kings are frauds." So the bill was lost, and Colorado continues to be the asylum of mining frauds.

If one were to form his judgment of the dimensions of Colorado stock operations by the holdness of the headlines and size of the exclamation points in the Denver papers, it would be that the boards are a daily scene of intense activity and excitement. One day recently the daily transactions were advertised under the headlines, "Advance in Stocks," "Great Amount of Sales," "Total Amount of Transactions for the Day, 14,000 Shares." The total sales for the day realized, less one sale, \$308.25. The exception was a heavy sale of 500 shares at \$2.15, bringing the total up to \$1383.25.

These things do the industry no good. It is not possible by such methods to convince really heavy capitalists that there is a great movement in stocks, and that now is the time to invest. We are bound to say also that the statements of enormously rich strikes in various districts now being sent out so industriously and so indiscriminately are not calculated to invite entire confidence in these fields. No man of experience in mining will accept them as true. They are absurd, and sound childish to old California miners. The effect will certainly in the end be to injure the very industry they are intended to benefit. It ought not to be so, for Colorado has gold fields of real merit. Several of the districts are already producers, and if the right methods are pursued, and if capital is not frightened away by such meretricious advertisements, others will secure the attention their merits deserve. But no permanent development can be assured if mining operations are made incidental to stock jobbing. The industry will have no genuine foundation, and it will fail.

It may be added, in this connection, that the manipulation of South African shares in the London market has become a very great evil, and threatens to do immense harm to the Johannesburg fields. The London *Mining World* recently contained an article severely attacking the methods in vogue. Says the *Mining World*:

As these mines are at present managed, the investor takes his chance in a big gamble, in which the actual merits of the properties scarcely count as factors. The best of the mines are manipulated by the big financial houses, and they do with them what they will. The investor, therefore, who sees the wonderful returns month by month should not base his calculations upon these, but upon the probable course that operators may take. When he invests his money and sees anything like a decent profit, he is very foolish not to take it, and to be satisfied with it, even should the "rig" be carried to a higher point than he anticipated. The chances are the "operators" might have got out before his profit was secured, and then, like Mr. Mantalini, they would have "grinned at him dembly." It is a great pity that an important industry like that on the Rand should thus be controlled by a comparatively small group of people, but it is no use blinking facts, and we intend to be plain-speaking about them.

THE tariff bill is to be reported to the Senate from committee next Tuesday. The general belief is that coal will hear a duty. There will probably be no change in the metals.

Why Silver is Down.

The heavy depreciation in value of the silver coinage of the world is certain to arouse the various nations to the necessity of its rehabilitation. The actual value of the silver dollar (judged by present New York prices) is less than fifty cents, and similar conditions prevail elsewhere. The general distrust in which silver is held is evidenced by the barriers raised against its international circulation. That is to say, a Canadian silver half dollar is not accepted at par in this country because its intrinsic value (expressed in gold) is not at par. An American half dollar is likewise discredited in Canada, but it passes at par in this country because the faith of the government is behind it. The government accepts the half dollar at par, and it is likewise accepted by individuals. It is true that England likewise guarantees its own silver circulation, up to a certain point; but England is a foreign country and its guaranty is not accepted in this country with the confidence held in our own government. In a more marked degree the distinctions between the several national coinages of silver are shown in South America. The nations in that part of the continent will not accept American silver. In Chile, for instance, the American half dollar is universally rejected. Why? Because this country is on a gold basis, and the dollar, expressed in terms of gold, is worth only half what it pretends to be.

The remedy is not necessarily a silver basis. Free coinage will settle the question so far as this country's coinage and its domestic circulation are concerned. But the international differences must be adjusted by international bimetalism. It is not too much to say that the countries of Europe see the necessity much clearer than when the conference at Brussels met. The depreciation in silver values lies as much as anything else in the fact that values are expressed in gold, and in the lack of confidence by each nation in the others' silver coinage; and the want of confidence arises largely from the fluctuations in the values of the two metals, making it impossible to tell one day what the exact relations of the metals will be the next. As long as values are unsettled, an interchange of moneys on a certain basis is impossible.

A previous agreement will change all this. An understanding that each nation will accept the moneys of the other at a rate previously agreed upon will remove the distrust of silver, restore it to its rightful position, and settle the monetary question. There are ample evidences that the nations of Europe are beginning to understand the situation.

Outlook for an Appropriation.

According to advices from Washington, California and other Pacific States that are in need of additional appropriations for waterway improvements are pretty certain to be disappointed in their expectations as to what this Congress will do in the way of making more money available for the needs of these States. Pacific Coast States, however, will not suffer much more than those in other sections of the Union. It is scarcely believed now that when the River and Harbor bill is reported to the House, and this report will be made within a few days, that there will be any provision for new projects in connection with waterway improvements. This assertion is based upon the fact that the total appropriation in the bill that will be reported will not exceed \$10,000,000, and may fall as low as \$8,000,000. Of course, the continuous improvements which previous Congresses have provided for will be continued. On account of the financial stringency it is necessary for this Government to cut all appropriation bills.

In view of these things the prospect for an appropriation for restraining dams in the Sacramento tributaries would seem to be dubious. It is certain that nothing will be obtained unless Congress is especially urged to make the appropriation; and it is likewise certain that the special needs of the State in this respect will not be adequately set forth, if no delegation, charged with the duty of informing Congress on the subject, is sent on to Washington. The great importance which California attaches to the matter is well attested by the conditional appropriation of \$250,000, already made by the State Legislature, for the construction of dams; and the willingness of the State to undertake the work in conjunction with the Government ought to be duly and properly emphasized. The time is already getting late, and it will be possible now only to get an amendment to the measure after it is reported to the House. There is no hope for a special bill. Something should be done at once.

THE ample rains and mountain snows of this year give assurance of abundant water, and the hydraulic miners along the Scott, Salmon and Klamath rivers are sure they will take out more gold than ever before. The season will last until late in the fall.

Surface and Deep Mining.

By Taylor D. McLeod.

In the otherwise excellent and pertinent letter of Mr. W. S. Chapman, in the last issue of the PRESS, entitled "Needed Changes in Mining Methods," occurs this remarkable statement: "The first thing to do is to sink a shaft, deep enough to prospect the mine thoroughly, so as to know whether you really have a mine or not. The shaft should be sunk, ordinarily, to 1000 or 1500 feet, levels opened at each 100-foot station, the veins crosscut at each level, and when that work has been done, the miner will know whether he wants a 20-stamp mill, a 40-stamp mill, or a 100-stamp mill, or any mill at all."

Not considering the utter impossibility of any set of poor men—miners—accomplishing a work of any such magnitude, this very erroneous opinion expressed in the columns of a journal of the standing and circulation of the MINING AND SCIENTIFIC PRESS, and permitted to pass uncontradicted, will certainly redound to the injury of mining prospects, i. e., undeveloped mines in a nascent condition.

At the first glance the inquiring capitalist, when confronted with a preliminary expenditure approximating \$50,000, to simply "prospect" and prove the value of a mineral vein, would unhesitatingly prefer to invest his surplus coin in the culture of rutabagas, or the manufacture of cheese from the Milky Way. I fully concur with Mr. Chapman in his condemnation of first building a mill and then hunting for a mine. Our hillsides and gulches are dotted with these monuments of too sanguine hopes, upon which "failure" may be written as an epitaph. Yet, if it required a 1000-foot shaft to find ore justifying the purchase of a stamp-mill plant, it is very doubtful if the music of a single run of stamps would be heard throughout the land. Of course, if there is a known ore chute, of value, demonstrated and dipping toward an adjoining claim, that probably might be tapped by sinking a 1000-foot shaft, it might be thought advisable to drive through a semi-barren zone for that purpose. But these are exceptions.

Again, it is a fallacy for one to pin his faith on the belief that "ore increases in value with depth." The vein may widen, and very often does, and the ore in a few instances becomes richer, but it is the exception that proves the rule. The character of the ore will change below the zone of oxidation and is found less "free."

The Bulk of Gold Near Surface.—It is safe to assume that 80 per cent of the value of the gold quartz mines (and they are the mines referred to, I believe), has come from and is being mined above the 500-foot level. Instances might be cited by the score. One or two illustrations will suffice. One is the Harqua Hala, Yuma county, Arizona, which, by the way, was twice, in its early stages, reported on adversely by California experts. Within four years of active life this mine returned an approximate output of \$1,500,000 in gold. It was sold, a few months since, for \$1,250,000, and this before reaching a depth of 500 feet. Again, the Vulture mine, same locality, thirty miles distant, with a record of \$20,000,000 output above the 600 level. California can furnish examples *ad infinitum*.

It is of prospects we are dealing, and a "prospect" premises a prospective, hence, suppositious value. To open a prospect aright requires a special and peculiar training. Each proposition must be considered individually and the plan of attack carefully determined, for misapplied development injures the property and is a costly experiment. There are then no assets; you cannot claim as realty a hole in the ground. And right here is where the danger lies: in the preliminary steps, the inception of the enterprise. Bucking against rock is slow and costly work at best. We must to the uttermost eliminate the element of chance. This is the province of the specialist in that line of mining.

How to Start to Work.—The ledge should be thoroughly pick prospected, after the topography and general physical condition of the immediate locality is understood. This is followed by shallow pits, shafts or open cuts crosscutting the vein at the most favorable mineralized points exposed. Careful tests and assays follow. This having determined the apex of the ore chute, then shaft sinking is in order, and drifts and crosscuts 70 to 100 feet apart to determine extent of ore chute, chimney or chamber.

Don't monkey with vertical shafting through the country rock or tunnel—unless there is an opportunity to drive an adit tunnel with the ledge. On prospect work, *find your ore and stay with it*. Later on, "working shafts" or tunnels can be run to facilitate cheap extraction. In preliminary open-cut crosscutting, if the ledge is wide it should be opened by a series of benches. An excellent way to secure check samples is to drive drill holes across the vein strata—a hole near each corner of and at foot of face of bench—carefully saving each six inches or foot of drillings, or the entire pulp if a general average is wanted,

for test or assay. Six to ten-foot drills should be driven into doubtful ground, or tapping the ground occasionally. The drillings kept for assay will save many a dollar in general mining, for there is more judicious economy required and possible in running a mine than in any other of the so-called legitimate enterprises. The curse of mining has been, and is, for that matter, not in the mines, but in the incompetent management, and that greater incubus, the "office mining." Take a given amount of money secured for development and working of a mine, fully one-half goes to keeping up the dignity of "the office" and its contingent ornamental constituency.

In conclusion, mines, like any other embryotic realty or property, are made, not found, and it takes money to do this. But a few years since "Nob Hill" was shifting sand dunes of little value. Money made it one of the most elegant and sightly localities of this country.

The judicious expenditure of a moderate amount of capital will make, almost surely, a good mining prospect where the conditions are found favorable. It is not a thing of value alone, but a producer of values. Hence, if a gold mining prospect does not show pay ore blocked out, on dump and "in place," to pay for all expenditures of development and cost of a stamp mill or other reducing plant, at the 500-foot level, it should be abandoned. Two hundred feet should "prove" the mine.

The reader should not infer from the above that the writer deprecates deep mining. On the contrary, deep mining is the most lasting and profitable of any class of enterprises. I wish to convey the fact that it does not require a vast expenditure of money to put a gold mine on a dividend-paying basis.

The aim and efforts of the actual practical miner are to put his mine on a self-supporting footing at the earliest possible moment, and, with the proceeds of the mine, purchase the more expensive machinery required in deep mining. The higher cost attendant on handling ore and water, timbering, etc., at the lower levels, to be met by the sinking fund (no pun) should be derived from the more shallow workings. It is a straight-away business proposition—make the mine pay for its own improvements toward the greater permanency assured in deep mining.

TAYLOR D. McLEOD.

San Francisco, Feb. 14, 1894.

Sliokens.

JAMES G. RULE intends to make another trip to the Comstock during the latter part of this week.

THREE THOUSAND river coal miners at Pittsburgh are on a strike against a reduction of half a cent per bushel in pay.

W. M. WATKINS, who was at one time superintendent of mines in Nevada, has died at Silver Cliff, Colo., of heart failure.

THE Plumas Eureka mine paid \$52,734 in dividends for the year 1893.

THE Arizona mining interests of C. W. Leach of Tombstone, who recently died of gas asphyxiation at Grass Valley, were worth over \$100,000.

THE Bunker Hill and Sullivan, at Wardner, is working one shift; the Frisco, at Gem, is working one shift, and the Granite has closed down entirely.

FRANK JURENS, who recently robbed the chlorination vats of the Alaska-Treadwell mine, Douglas Island, of \$10,000 worth of precipitates, has been arrested at Juneau.

CONGRESSMAN CAMINETTI denies that he is opposed to the improvement of Oakland harbor and Petaluma creek. He is simply opposed to their improvement under the continuous contract system.

GOV. JOHN E. RICKARDS of Montana is an ardent champion of silver. He believes that the white metal will be restored to an equal place with gold in the coinage of the country, and that in the next Presidential struggle the Republican party will champion free coinage.

THE Mammoth Mining and Milling Company has been incorporated. Principal place of business, Madera, Madera county. Capital stock, \$1,000,000, with D. M. Tomlin, C. G. Parsons, Robert L. Hargrave, H. J. Tomlin and B. W. Child of Madera as directors.

THE Tacoma smelter's output for January was 3200 bars of bullion, weighing 333,239 pounds, and valued at \$69,144.43. There were 2067.59 ounces of gold, valued at \$42,737.08; 23,693.31 ounces of silver, valued at \$16,065.42; and 331,472 pounds of lead, worth \$10,341.93.

A BEAUTIFUL piece of gold weighing \$41.90 was found by some rockers in the tailings in Nugget gulch, near Murray, Idaho, on Saturday last. It was flat, with one of the sides partially turned up. Not a speck of quartz was in it. The tailings are yielding almost as much as the original gravel.

THE Mercur mine of Utah has been sold to a syndicate, headed by Colonel Wolcott, of Colorado, for \$1,000,000. This mine has been paying dividends off and on for some time. The Mercur mine and mill have been frequently alluded to in this paper. Cyanide is in successful operation at the mill.

TELEGRAPH advices from Phoenix, Arizona, say that the Bob Groom group of mines in Whipsaw gulch, 30 miles north of Phoenix, has been purchased by W. M. Wilson, representing San Francisco capital. The price paid was \$100,000. The property is considered very valuable and is well developed.

THE Virginia Enterprise says: "The work of reopening the Central tunnel, to prospect the ground in the west part of the Ophir, is progressing at the rate of 100 feet a week. The tunnel has a total length of 900 feet, and the work now in progress is to make a connection with the Mexican shaft to secure an

air supply. When the tunnel is reopened its full length exploratory work of unusual interest will follow, as it is among the probabilities that even a more important discovery than the 'Rowe find' may be developed, as that vicinity is noted for gold-bearing quartz stringers, which, if followed, may result in the uncovering of an important ore body."

THE Poorman mine, at Burke, although closed down, is giving employment to 55 men. They are repairing the shaft, making the raise, putting in the compressor plant and overhauling the machinery in the concentrator. The bed for the compressor is completed and a building is being erected over it.

J. V. KEELEY, of the Yellow Pine mining district, Nev., is in the city. He says the recently discovered Keystone mine is working a ten-stamp mill and turning out \$30,000 a month. The average pulp value of the ore, he says, is about \$100 a ton. The railroad which is being projected from Goff will, it is thought, do great things for the district.

IN spite of the great depression of silver and lead, many of the mines of Aspen, Colo., are able to work at a profit. Such properties as are now working without loss are, with few exceptions, those which have the advantages of tunnel facilities in their upper, and electric machinery in their lower workings, reducing the cost of getting ore and waste to the surface to a minimum.

THE Mammoth mine, in Arizona, is about to resume operations after a suspension of six months. The local importance of the resumption of work with a full force is apparent when it is stated that the company distributes \$12,000 to \$16,000 per month for labor and supplies, 75 per cent of which circulates in Tucson. The mine will be running in full blast in a few days.

ARTICLES of incorporation of the Golden Cheriot Mine and Milling Company have been filed with the Alameda County Clerk. The capital stock is \$100,000, divided into 100,000 shares of the par value of \$1 each. The subscribers for stock are: A. F. Trenchel, 33,183; W. W. Moody, 100; William F. Hendsch, 16,666; Fred H. Ferr, 100; L. T. Farr, 33,183; Julius J. Hendsch, 16,667; O. E. Ferrigo, 100.

H. J. GOETHE, A. Meister, M. Miller, Thomas Rudick, Emil Heinrich, R. J. Gordon and Charles Schmidt have organized a company called the Pleasant Ridge Ditch Company, for the purpose of constructing and operating ditch properties, and to acquire, use and sell water and water rights. The gentlemen organizing the above company are interested in the Live Oak mine at Pleasant Ridge, Nevada county.

JAMES CHRISTIE, a prospector and miner, has recently returned to this city from a trip through New Mexico. He thinks that to be a very promising country in a mining point of view, and says that in Lincoln county, 12 miles from White Oaks, there is a vein of iron ore averaging 64 per cent of iron. The vein is 600 feet long and 24 feet thick. Within 15 miles of this iron, there is a vein of coal eight feet thick. Picarilla is the name of this promising locality.

THE House Committee on Public Lands has voted to favorably report the bill of Hartman of Montana for determining the title to mineral lands in Montana and Idaho within the limits of the land grants to the Northern Pacific Railroad. Under the bill, commissioners to be appointed by the President are to examine and classify as soon as possible all lands within these grants with regard to their mineral character. They are to reject all claims on behalf of the Northern Pacific on mineral lands, exclusive of coal and iron property. The action of the commissioners is to be final.

ARISING from the ashes of the Bullionville fire of last July, says the *Pioche Record*, comes the Phoenix Reduction Company, organized recently by W. S. Godhe and others under the laws of Nevada, and which promises much to its incorporators in the immediate future. Its property consists of the tailings there, some 75,000 tons or more, and the new mill just set in operation. One of the main features of the business will be to reduce Ferguson and other ores, and the company expects to be in a position to do this in a very short time.

A suit has been filed in the Superior Court that bids fair to rival the sensational developments in the notorious Hele & Norcross expose. It is entitled the Alta Mining Company vs. Monroe Thompson, R. N. Graves, L. Osborn, I. E. Jacobus, George H. Pippy, W. S. Wood, Chanceller Derby, E. Miller, E. D. Boyle, Charles Derby, Thomas Fitzsimmons, S. G. Whitney, I. P. Martin, I. W. F. Peat, the American Mill and Mining Company and Louise Arner Boyd. The complaint charges the late Seth Cook with having been at the head of a conspiracy of directors to control the mine for their own private ends. Bold assertions are made that "the conspirators" stole the stockholders' money right and left. An outline of the charges was contained in the Press of January 13th.

VERY often, says the *Denver Mining Industry*, we read in the newspapers published in the older mining towns, that Mr. So and So—John Doe or some other man—who has been off to other mining regions, seeking fresh fields and pastures new, has returned to "his first love," and declares that it is the best region he has seen. The fact of such an announcement is an illustration of a mining business truth worth considering. This truth is, that familiar and close acquaintance with a mining district is necessary to most men to actually know its merits. Incidentally it bears evidence that there are striking differences in mines and the methods of ore occurrence in different regions, each of which may be equally good, and that a man who knows one well, and has all his hearings there, may be at sea in another, and have a poor opinion of it, even though it may have equal or greater merit than the one he is best acquainted with.

Foundry Notes.

THE Fulton Engineering and Shipbuilding Works are building six 34-foot sectional Huntington mills for a mining company near the city of Mexico. A machine-shop outfit goes also with the plant.

THE Harqua Hala Mining Company, Ariz., is having constructed at the Union Iron Works a ten-stamp outfit, to be added to their 20-stamp mill.

THE Parke & Lacy Co. has been awarded the contract of heating the Garfield school, Oakland, with Smith furnaces.

The Trans-Mississippi Congress.

The Trans-Mississippi Congress, now in session in this city, is engaged in the discussion of various questions of moment to the great West; but at this writing (Thursday) no action of importance has been taken on any of the larger subjects. A variety of resolutions on the silver question have been introduced, and there is no doubt that some strong declaration favorable to silver will be made. River and harbor improvement and the arid lands will of course occupy a large share of attention. At this writing, the Congress has just tabled a resolution declaring that partisan questions shall not be touched; and the inference plainly is that the majority propose to discuss the tariff and the Hawaiian question.

Among resolutions introduced is the following by Grove L. Johnson of Sacramento:

WHEREAS, The Sacramento and San Joaquin rivers, the great waterways of California, are threatened with destruction by debris from hydraulic mining; and

Whereas, The filling of the channels of these rivers by such debris causes immense injury to adjacent farming lands; and

Whereas, The discontinuance of such mining prevents the output of large quantities of gold and the community suffers from the lack of the money which should be made of that gold; and

Whereas, The nation alone can cope with these conflicting conditions; now therefore be it

Resolved, As the sense of this Congress, that the Government of the United States should make sufficient appropriations for and cause to be done such work of impounding mining debris as may permit hydraulic mining without its causing injury to the navigable waters of this State and to adjacent lands, and to provide necessary appropriations for improving and maintaining the navigation of such streams.

Another is:

Resolved, That we are in favor of the passage by Congress of a bill creating an executive department of mines and mining.

Another from the California delegation is:

WHEREAS, One of the most important questions demanding the attention of California is that of cheap inland transportation, and to secure that result the improvement of the navigable rivers, extending over 1200 miles in length, in the State of California, is a matter of imperative necessity;

Whereas, Owing to various causes, the navigability of these streams has been impaired, and the attention they have received from the Federal Government has been insufficient to restore them to their original condition; and

Whereas, Owing to the low prices prevailing for all products of the State of California, the interests of the farmer, fruit-grower, wool-producer, and every other person engaged in shipping produce, requires that relief should be full and speedy; therefore, be it

Resolved, That we urge upon Congress the importance and necessity of improving and preserving the navigable streams of California, and their tributaries, and we urgently ask that the improvement of these streams be done under the special contract system, and that the bill now pending in Congress, introduced by the Hon. Mr. Caminetti, to that end, be promptly passed.

And another is:

WHEREAS, It is evident to all that the completion of a waterway connecting the Atlantic and Pacific oceans will materially encourage commerce and immediately promote increased population and development of the national resources of the West; therefore

Resolved, That this Congress declare it is earnestly and steadfastly in favor of the immediate completion of the Nicaragua canal, and that such canal be controlled directly by the Government of the United States.

To Hydraulic on a Large Scale.

The extent to which hydraulic-mining operations can be carried on under the Caminetti act will be shown by the Quincy Mining and Water Company, owners of the Spanish Ranch mine, Wapaunsee creek, Plumas county. A series of four dams is under construction in the creek, and a storage capacity, aggregating 4,900,000 cubic yards, will be afforded. The dams are very securely built, being rock-filled cribs which are made of huge logs bolted together in the usual fashion. They are models of strength and well fitted for the purposes for which they are intended, that of restraining the debris to be washed from the large and rich gravel deposits above them and preventing it from reaching Spanish creek below. The Plumas *National-Bulletin* reports that these dams will be finished this week. As soon as this work is done, the Commissioners, accompanied by Messrs. O'Brien and Ralston, are expected to go up to Plumas to inspect the completed dams. If satisfactory to the Commissioners, and there is no doubt on that point, a license to mine will be duly granted, thus enabling the company, as soon as the water season opens, to begin washing gravel. The water season will thus be utilized, the debris securely impounded and restrained, thus resulting in no damage to the lands or streams below, and permitting the company to extract and put into circulation much of the gold with which the gravel deposits abound.

The Quincy Mining and Water Company is a large corporation, among whose stockholders are men prominent in financial circles. William E. Hall is president; Dr. James Simpson, vice-president; W. C. Ralston, secretary; James O'Brien, manager; Bank of California, treasurer; A. B. White, superintendent, and Charles R. Thompson, assistant superintendent. Peter Dean, Col. Roberts, Frank Goby, Robert Watt and Mr. Layton are also among the stockholders. The present holdings of the company embrace about 2200 acres of mineral lands and a large ditch

about 40 miles long. It is a mammoth enterprise and will be a profitable investment.

There are others of old California hydraulic mines which afford as good facilities for impounding debris as the Spanish Ranch. It is true that, in this instance, it has been necessary to make a considerable outlay in order to put the mine in shape for operation; but it was either that or nothing. The value of the gravel was known, and it could be demonstrated almost to a dollar what investment would be required to insure certain returns.

It is probable that many of the other large mines which were formerly producers, and which have been idle for ten years or more, would start up but for lack of capital. Many owners of rich hydraulic mines are penniless, or, rather, are unable now to provide means to resume. It may confidently be expected, however, that as soon as the Spanish Ranch and a few others show that, under favoring circumstances, it is possible to operate on a large scale, as in former days, money will be more available than at present.

Mountain Mines—Tuolumne County.

TO THE EDITOR:—The following mines are situated at Arrastraville, about three miles east of the town of Soulsbyville, and deserve attention:

The Donnelly mine is owned by parties in Soulsbyville. It was last worked in 1893, and had splendid prospects. The mine was discovered and worked in 1859 or 1860 and yielded at least \$50,000, the ore paying \$40 to \$60 per ton in free gold. The sulphurets were not saved at that time, as there was no way of working them from which there was not considerable loss, as they were of a high grade. There are several chutes of ore in this mine, and all of good length, and from 18 inches to four feet in width. The mine has been opened by shafts, which are now timbered and in good condition, also by tunnels. Timber for wood and mining purposes can be had on and near the mine, also water with a fall vertically of 200 feet for hoist, mills, etc. It is in slate formation and is accompanied by a dike.

The Easton mine, now idle, is owned by Condey & Cazeretto. The formation is granite. Considerable gold has been taken out of this mine in years past. Some of the ore was very rich in free gold, and some of it had a good percentage of sulphurets. The developments so far made upon this property consist of two shafts. The main shaft is on an incline, and about 200 feet in depth a drift is run north on the vein. There is also a tunnel run in to the north of the shafts, to tap the vein. Good ore was also taken from this tunnel. The vein in this mine is not of a large size. The owners are now running a tunnel to tap the mother vein near the Easton. Ore to the value of \$40 per ton has been taken out of this vein near the surface. It requires 200 feet of a tunnel to tap the vein. About 150 feet of the tunnel have been completed, and should the pay chutes worked above continue down, this tunnel will give them good backs and a large quantity of ore can be taken out, as the vein is of a large size. The Tuolumne Water Company's ditch runs above the mine and this will give good power for mill, etc.

The Duffield mine, owned by E. M. Scanlveno, is situated near the last mentioned mine. The vein runs north and south and is represented to be 8 to 16 inches in thickness, and the main chute is 200 feet in length. The owners claim the ore will run \$36 per ton in sulphurets and \$8 in free gold. The surface was worked years ago for the free gold, but as depth was gained it turned into base ore, and the inability of the owner to put up works, etc., for reducing the ore, accounts for the mine being closed down. It is drained by a tunnel run in from the west, and a drift run on the vein, 150 feet in length, from the drain tunnel. There is timber on and near the property. Good water power can be had from the water company's ditch and the mine can be prospected with small capital.

The Florence vein is now worked by the owners. A tunnel has been run in about 90 feet; a shaft will be sunk from the tunnel and a crosscut of 16 feet will be required from the shaft to strike the vein. I am informed that the ore from the vein paid \$30 per ton, and as soon as opened again the owners expect good returns from it.

The old Good Hope mine, which was first worked several years ago, is now owned by Giekey & Co. There is a vein from 1 to 5 feet in width, and ore prospects good. It has been opened by shaft and tunnel. It should be a cheap mine to work as it is situated near the north fork of the Tuolumne river, and free water power can be had from the river or Basin creek. There is also timber on and near the property.

MINER.

February 12, 1894.

THE announcement is made that Prof. E. E. Barnard is to leave Lick Observatory to assume charge of the new observatory of the Chicago University, near Lake Geneva, Wis. Prof. Barnard has been selected from among a large number of available astronomers to direct the operations

of the great Yerkes telescope, which is shortly to be mounted. He has been identified with Lick Observatory since its inception, and he has done much in a few years to render the observatory famous and place his own name among the first of contemporaneous scientists. His greatest achievement was the discovery of the fifth satellite of Jupiter, September 9, 1892. His departure from California will occasion general regret.

The Proposed Mining Law.

TO THE EDITOR:—I have given careful consideration to the "Miners Association Bill," published in your issue of Nov. 11, 1893, and alluded to in connection with the miners' delegation in your issue of Jan. 20, 1894.

The draughtsmen have done unusually good work. They have resisted the common temptation to make changes merely for the sake of change. Nearly every clause of amended Section 2324 appears in language which has been already construed by the U. S. Courts, and has, therefore, an ascertained judicial meaning. This meaning is not always by any means the popular meaning. The course adopted by the committee tends to prevent litigation by the exclusion of clauses the interpretation of which by the courts might be doubtful.

I would, however, suggest that, in connection with the filing and record of proof of labor, the word "shall" be used instead of "may." The change would make the meaning clearer to the lay mind.

Section 2334, R. S., should be further amended so as to provide that the regulations affecting the survey of mineral claims shall be *and remain* as they existed Dec. 1, A. D. 1884, thereby eliminating at one swoop a mass of vexatious, and, in some cases, illegal regulations of the Surveying Department having no apparent object unless it be to render the procurement of title to mineral lands as difficult and expensive as possible.

The amendments proposed to Section 2335 will be approved by every miner. They express the intentions of Congress at the dates of the acts of 1866 and 1872.

To foster the mining industry and facilitate the development of the mineral sections of the public land was the clearly expressed intention of Congress—an intention constantly over-ridden and thwarted by the corporation-ridden Department of the Interior.

I agree with the committee that in no long time the enactment of a mining code will be necessary. That code should cover procedure in the department as well, and deprive the secretary and his subordinates of the power to make "regulations" (now often made with the effect of practically nullifying the law).

The "regulations" should be a part of the code. When they are so, the scandalous whimsicalities of the department will cease to offend all decent men.

In a recent case in New Mexico two parties claimed parts of one forty-acre tract as coal land, the whole of the same forty being claimed by an agricultural claimant. The same evidence was by agreement used in both cases. The evidence disclosed coal north and south of the forty-acre tract, in such position that the outcrop must necessarily underlie it. Coal was disclosed upon the coal claim comprising an old and rejected mineral survey which crossed the middle of the forty. The sapient solons of the department finally held the central tract within the forty to be coal land, and the two outlying lots north and south of it, which were demonstrated to have acknowledged coal lands north and south of each of them, and developed coal within a few yards of each of them, to be agricultural land. And all this after having accepted entry at \$10 per acre as coal land, which \$10 per acre was duly confiscated by the department, of course.

This bill is a step, and a very important one, in the right direction; but we shall not be satisfied until we get a full mining code, and one which will deprive the Department of the Interior of its enormous powers for mischief.

Lincoln, N. M., Feb. 5, 1894.

* * * *

THE Southern Pacific has done a beneficial thing in reducing the rates on ore shipments from Shasta county. A new schedule has been issued which is as follows from Redding to San Francisco:

Ore and concentrates valued at \$50 or less per ton, \$3.80 or \$45.60 per car load of 12 tons.

Valued at \$100 or more than \$50 per ton, \$5, or \$60 per car load of 12 tons.

Valued at \$300 or more than \$100 per ton, \$6.20, or \$74.40 for carload lots of 12 tons.

Ore lots of four tons or under 12 tons, \$4.56 per ton.

Ore lots of one ton or less than four tons, \$5.32 per ton.

Lots less than one ton, 60 cents per 100 pounds.

Great reduction has also been made in the shipment of base ores.

When we take into consideration that the charge on car load lots of ten tons for ore valued at \$50 or less was \$73, it will be seen that the reduction is nearly one-half.

Chlorination of Gold Ores in California.

Written for the MINING AND SCIENTIFIC PRESS by G. F. Deetken, M. E.

Statements based on assays of small quantities of gold-bearing ores are frequently met in metallurgical journals claiming a loss of gold in an oxidizing roasting of sulphureted material. The conclusions arrived at are mostly based on slight differences in assay value of raw and roasted ore. But unless results are derived from larger and a greater number of assay samples, we might safely depend on the conclusions of Plattner's exhaustive tests—that no gold is lost in an oxidizing roasting.

In a chlorinating roasting, however, the loss of gold in many ores, particularly those carrying tellurium, is very pronounced, and it may be laid down as a rule never to subject a gold ore to a chloridizing roasting, unless previous tests indicate an exception.

An addition of a few handfuls of salt, added a few minutes before the drawing of furnace charge, to give it a chance to decrepitate, appears to have no prejudicial influence on gold, but is a greater help than naturally expected in the following treatment.

The ore discharged from furnace chest remains in a heap until cooled off to some extent.

Of great importance in the roasting of concentrated sulphurets is the proper construction of the roasting furnace, and the temperature at which the roasting is conducted.

Every experienced operator has observed that the results obtained in the first furnace batches of concentrates are invariably above subsequent results; the perfection of roasting—to three-eighths of one per cent of sulphur—being alike in both instances.

The writer considers the encasing of gold particles by slagging of iron, particularly near fire-bridge, the true cause of these observed facts, the steam or moisture of the bottom in first charges preventing such slagging.

It is also a recognized fact that, by thinning down the charge in a reverberatory roasting furnace, the resulting gold bar shows an increase of extraction, the shallow layers of ore allowing a rapid peroxidation of the iron, increasing its refractory character.

A high fire-bridge, high arch, good draught connector, with proper dust chambers, are therefore essential conditions of close extraction of the gold. A low heat in roasting has a number of advantages, which consist in a highly porous condition of the peroxide of iron, favorable to the penetration of the chlorine, in preventing the melting of gold to the globular form, unfavorable to extraction, and also in preventing the inclosure of gold particles by slagging.

The roasted ore moistened with about six per cent of water is impregnated with chlorine gas until it forms heavy white vapors on top of the ore with ammonia. The vats are covered by a light sheet-lead cover, properly sustained on a wooden frame by an overhead trolley, a water joint on the outside of the vat, well tightened by an application of asphalt plastic, poured into the sheet-lead trough, completing the outfit. A second gasing the next day with an equal quantity of gas, the surplus passing into the next and fresh or new charge, finishes the impregnation with gas.

The third day the ore is leached in the usual way. The gold solution is run into a small tank to deposit accidental sands and impurities, and run, when clear, into the precipitating tanks. The gold is now precipitated by a current of hydrogen sulphide. A gas pipe, leading from a puncheon or other larger tank-connector with a water column of at least 12 feet pressure, leads the air pressed through the sulphureted hydrogen generator into the solution and helps to agitate it. A small quantity of waste liquor from the hydrogen-sulphide generator is added to the gold solution after the free chlorine is expelled and the gold partially precipitated. When much copper is present in the solution a fractional precipitation of the copper will find the gold precipitated from the solution.

The writer has experienced a case in which a lot of roasted sulphuret tailings assaying \$8 per ton were regased. The solution from the leaching tanks showed no gold precipitate with iron protosulphate. A precipitate from the solution with hydrogen sulphide gave, when melted with litharge and cupelled, a result of \$8 in gold—the full assay value.

The extraction of fine gold of high caratage by vat chlorination is very perfect. Coarse gold cannot be extracted in the usual time, and is more economically extracted by stamping with quicksilver in battery.

Gold of low caratage cannot be extracted successfully by chlorination. When silver compounds and gold of high caratage co-exist in the same ore, the silver is extracted by subjecting the tailings treated by the above method to a chloridizing roasting with about five per cent of raw sulphurets and treating the roast with hypo solution. The hypo is daily reinforced by an addition of a few pounds of he salt. When the filters consist of burlap and are kept in

proper order, no great loss of hypo is sustained by the action of the chlorine still existing in the solution, as one molecule of hypo neutralizes six molecules of chlorine. The fear of an able writer that tens of thousands of tons of silver ore had been treated in California by hypo solutions, made useless or destroyed by chlorine gas in previous leaching, appears unfounded to the writer. Aside from the fact that such an amount of silver-bearing gold ore was hardly ever treated here, the operators, though mostly of the "muscular amalgamator" class, know that from 60 to 65 per cent of the silver is expected of them under the most unfavorable circumstances.

Additional difficulties arise in the treatment of sulphureted ores by chlorination by the presence of alkaline earths, also alumina, from the graphitic slate of the mother lode of California; also copper and lead. Lime requires a close elimination by concentration so as to be covered by the sulphuric acid formed in roasting magnesia, forming, like lime, a hypochlorite, which has a tendency to form an objectionable cement in the roasted and moistened ore, and has to be removed as far as possible by acid leaching, unless a chloridizing roast on the ore is admissible. The Enreka sulphurets—Grass Valley—in 1865 allowed, with a chloridizing roasting, an extraction of 97 per cent of the gold on sulphurets containing 12 per cent of magnesia (95 per cent of the gold value being guaranteed).

The copper, when in larger quantities, above a few per cent, is extracted from the roasted ore, as first applied by Allain, by diluted sulphuric acid.

Mr. Jory uses Monnier's process of roasting with salt cake, extracting the sulphate and completing the copper extraction as far as possible with diluted sulphuric acid, while Mr. Butters extracts the oxidized copper, as well as the alkaline earths, at once with acids. Mr. Jory finds, with the writer, no difficulty in treating ferruginous quartz carrying limited quantities of lead (up to five per cent of carbonate).

The present cost of extraction of gold by vat chlorination is not above \$7 a ton, with labor at \$2.50, wood \$4 per cord, acid $1\frac{1}{2}$ cents, manganese 2 cents, salt one-half cent per pound in San Francisco and freight at \$20 per ton.

East of the Rockies, the barrel chlorination, by means of acidulated bleaching powder on unconcentrated ore, under the management of J. Rothwell, A. Thies, Langguth and others, has obtained most favorable results.

The *Engineering and Mining Journal* of Jan. 27, 1894, mentions \$2 a ton as a possible Western cost of barrel chlorination. Considering that this estimate includes the dry crushing and tramming of the ore to the works, it certainly appears a most astonishing feat of metallurgical economy.

Concentrated sulphurets, on account of usual presence of elements consuming larger amounts of sulphuric acid, when treated by acidulation of the roasted pulp, are less adapted to barrel chlorination, on account of the limited amount of material on hand, and can be more economically treated by vat chlorination.

Should bromine give as favorable results in gold extraction as chlorine in the treatment of concentrates, the excessive consumption of acid would be avoided. Mr. Godshall's late experiments on this subject appear to speak for nearly equal dissolving power of bromine and chlorine for gold.

G. F. DEETKEN.

Anburn, Feb. 5, 1894.

Making Gas from Coal Oil.

Wm. McDermott has become interested in a new scheme that promises to revolutionize the coal and wood business in Butte, says the *Butte Inter-Mountain*. It is the scheme of making gas from coal oil and using the gas in stoves for heating and cooking purposes. Mr. McDermott has had this system of fuel in use at his residence several days and claims it works successfully.

Two stoves—one a kitchen stove and the other a parlor-heating stove—were fitted up at the M. C. Harris Company's place of business on East Granite street recently, and the gas-heating apparatus was inspected by a number of people. All who saw it were pleased with it. It is claimed this coal-oil gas can be used for half the cost of coal and wood, and will furnish any degree of heat. The equipment necessary is an oil tank containing about 15 gallons of oil. As many pipes as there are stoves in a house may be connected with the tank.

An air pump is also used to pump air in at the top, when a flow of oil is required. The oil goes out through a hole of needle fineness, through a pipe which leads to the grate of the stove. The oil empties into a hydro-carbon burner, which is placed in the fireplace of the stove. As soon as the oil enters the stove, it becomes gas. There is a valve on the oil-pipe to regulate the flow. Many advantages over the old methods of heating are claimed for this coal-oil gas.

Metalliferous Mining in California.

Abridged from Interview in *London Mining Journal*, January 20, 1894.

There are few names more familiar in mining circles in America, and more particularly, perhaps, on the Pacific Slope, than that of Mr. John Hays Hammond, the well known mining engineer. Indeed, his name is almost as well known on this side of the Atlantic as it is on the other, and it may be taken as a general axiom that any enterprise with which Mr. Hammond is associated carries with it the certain hall-mark of being "a good thing." Mr. Hammond was a few months ago appointed to take the management of some very important mining interests in South Africa, and, before leaving for the Transvaal, he paid a flying visit to London. Naturally he gravitated towards the *Mining Journal* office, in order to shake hands and exchange notes with us. In an interview he placed his views on mining on the Pacific Coast, and more particularly gold mining in California, at our disposal.

"Mr. Hammond, what is your opinion of the future of gold mining in California?"

Mr. Hammond had no hesitation in replying to this question. "I think," he said, "California has a very good future before it in gold mining—that is, I should say, in quartz mining."

"And what about the alluvial?"

"There are hundreds of millions of dollars worth of gold in the alluvial deposits, but the great question has been: how can they be worked satisfactorily without causing injury to the farming lands beneath them? I may say in this connection that I was a delegate representing California at Congress. The State of California was losing very seriously by the shutting down of hydraulic mines. People now are almost unanimous as to the advisability of resuming hydraulic operations."

"What about quartz mining, Mr. Hammond?"

"In California it might be said generally, with the exception of a few discoveries made from time to time, that quartz mining has resolved into an economical development of low grade, or comparatively low grade, mining properties, which a few years ago could not be profitably handled. These can now be worked profitably by the introduction of better mining methods and appliances. We are working on lower grade material than has been handled previously. In the early days of mining only such deposits were worked as were extremely rich on the surface. Those deposits have now been worked out. There are, of course, a great many other deposits of relatively low grade which can still be made to pay by better mining methods. That, so far as quartz mining is concerned, is the future hope of California. In point of production the future of quartz mining is more important than that of hydraulic mining, because the hydraulic deposits are of limited superficial area, while the quartz mines extend in depth and may be worked on after the hydraulic mines are exhausted. But still there is a very large extent of auriferous gravel territory which can be profitably worked by hydraulic methods."

"You still consider, then," we asked, "that gravel mining is by no means played out?"

"Certainly not. In fact some of the very best gravel mines of the State were just starting to produce when the process of law shut them down. With reference to quartz mining, the best are mines which have been abandoned and reopened. These mines were closed down through extravagant management, but have been reopened and are now producing very profitably. Two of these I have reopened myself, and they have paid the cost price of the properties and are paying large dividends to-day, simply by the introduction of better and more recent methods of extraction."

"What is the principal system of extraction now being adopted in those districts?"

"The system of gold milling in California is similar to that in Johannesburg. Probably there are some improvements in the details of the process in California, but upon this I am not able to speak very definitely, as I am not familiar with the processes now used in South Africa."

"In the actual matter of extraction of gold, is there any particular process which obtains in California in preference to others?"

"No, I cannot say there is. Our method, broadly, consists of amalgamation, concentration, and the extraction of gold from concentrates by, usually, the chlorination process—that is the old Plattner process."

"Then, apart from gold mining, Mr. Hammond," we asked, "what have you to say about other metalliferous mining industries in and around California?"

"Well, there is little to say. There is not much activity in the other metal mines. Indeed, comparatively little can be said about the States generally in this particular. The low price of silver and the depreciation in the value of lead has necessarily affected the American lead and silver-lead mines. Copper keeps up its price pretty well, and

the copper mines are being profitably worked in many parts of the Union."

Mr. Hammond had, at the time of our interview, just returned from Edinburgh, whither he had gone to present a report to the directors of the Arizona Copper Company. "This property," said Mr. Hammond, "is being worked at a profit, and they may be able to recover a considerable portion of the money which was originally invested."

"Perhaps I should mention," added Mr. Hammond, as we returned to the main thread of the conversation, "that I am the president of the Bunker Hill and Sullivan Mining and Concentrating Company, which is the largest lead-producing mine in the United States. We have had a good deal of trouble with the labor difficulty, but have succeeded in settling that satisfactorily to ourselves, and at present we are closed down on account of the indisposition of the railroad company to make any reasonable rate with us."

"You have your railway rates troubles, then, out West, just as we do on this side," we suggested.

"I should just think we have. Why, we have been paying \$16 per ton, and have been shipping from 80 to 90 tons per day."

"Have you anything to say about the mechanical engineering of your mines?"

"Well, we have the Mona lead concentrate plant with a capacity of 800 tons per 24 hours. Our ore is carried on a Bliechert aerial rope tramway a distance of two miles. It is delivered into the mill and is automatically worked through all the operations of concentration. We employ about 500 miners and surface men, the general average wages being \$3.42 per day per man. The plant was made by Messrs. Fraser & Chalmers, of Chicago, under our specifications, and it is said to be one of the best plants existing for economy in working. We have water power brought in from a distance of three miles in a large flume carrying 10,000 miners' inches, developing about 1000 H. P. at the mill. Our property is what is considered a large low grade mine, and in order to work this property to advantage, continuous operations must be obtained and economy in all directions exercised. The system adopted is the ordinary German concentration process, consisting of crushing by rock breakers and rolls, then sizing by trommels and concentration by jigs, with further classification by hydraulic classifiers, and the concentration of slimes by revolving baddles and Frue vanners."

"Do you favor the principle of a company or syndicate over here that is interested in a property in America sending a man out from here to inspect and report, or do you think it better to engage a man who is already on the other side?"

"I think local experience—experience of the people of the country and the conditions of mining—is a *sine qua non*, together with a ripe judgment as to the value of a property. I think that English engineers, when there is very much at stake, should have some local engineer to co-operate with them in making their inspections and investigations."

"You would not recommend an English syndicate to employ an English mining engineer unless he had some local knowledge in addition to his own?"

"I should prefer to say that I think he should have the assistance of some local engineer. There are a great many English mining engineers who have had extensive experience in our country, and who are therefore good men. I think there is no economy in trying to save the expense of experts in the first instance. If the property turns out a good thing and is taken up on the recommendation of an expert, the fee is insignificant in comparison with the benefits accruing. On the other hand, if the employment of some local engineer should result in preventing the company from investing its money there is a good deal saved."

"How is it that so many of your countrymen come over here to seek capital for their mines?"

"We do not come over here except for money for enterprises requiring large investments. Our own engineers of good standing can raise all the money for the small operations, but it is difficult to get money for very big mines in our country. A good engineer who is successful and has the confidence of the public could get all the money for small enterprises, but when it comes to large amounts he can do much better in England."

THE Sacramento *Bees* Folsom correspondent sends the following: Folsom bids fair to again experience the golden, bustling days of '49. As an adjunct to the renewed interest excited by the many rich strikes made by the miners here, merchants have engaged four-horse freight teams for the purpose of bringing their store supplies from Sacramento, as they claim that during the present hard times freight rates have been increased to such an extent that cheaper transportation can be had by team.

THE miners of the California mine, Eureka district, are on a strike. They formerly received \$3 a day, and now the wages have been fixed at \$2.50.

Hydraulic Mining.*

A REVIEW OF THE INDUSTRY BY DR. HENRY DEGROOT.

In Eight Parts—Part VII.

Lighting the Washing Pits at Night.—As hydraulic mining is, during the water season, carried on without interruption, it becomes necessary to illuminate the pits at night. For this purpose great fires of pitch-pine wood were formerly in use, as they are still by all but the larger companies, some of which have introduced the electric light, the machine used being the Brush pattern, which for running it requires four-horse power. When in use this style of light has been found economical, it affording a much stronger as well as a more reliable light than the pine wood. These machines, everything included, cost about \$2000 set up and ready for use.

The Gold-Saving Implements and Appliances.—The gravel brought down by piping finds its way directly into the sluice, small ditches, when necessary, being cut in the bedrock for conducting the admixture of water, sand, gravel and cobbles into the sluice, the boulders and larger cobbles being retained and piled up in the washing pit. The sluice is a race or flume constructed of planks or cut in the bedrock, usually the former, and constitutes, with its appendages, the principal gold-saving agency in hydraulic mining. Formerly the sluice, instead of a continuous race, consisted of a series of small wooden troughs open at both ends, the lower end of one fitting into the upper end of another. These troughs, each 12 feet in length, were termed "boxes," and a series of these so joined together, was called a string of sluices. When there is so little dirt to be washed that it can be thrown in with a shovel, instead of being piped down and swept in with a strong current of water, as in hydraulic mining, the old style of sluice is still in use. Ground sluicing consists in breaking down the auriferous earth with a pick or crowbar into a running stream, or by water brought in for the purpose, it is washed, and that generally without the aid of a sluice or any mechanical device.

The size of the sluice depends upon grade, quantity of water, and character of material to be washed. Length, within certain limits, on the natural facilities there may be for extending it, and nature of the gravel, some flumes having a total length of a mile or more. Where the purpose of the sluice is the conveyance of the tailings a long distance below the mine rather than saving the gold, it may have a length of several miles, such prolongation of the main structure being called a tail sluice.

As a general rule, the length of a flume should be sufficient to insure a thorough disintegration of the gravel passing through it, and allow the finer particles of gold to settle in the riffles or be caught by the quicksilver.

A sluice six feet wide and three feet deep set on a four to five-foot grade will suffice for running 2000 to 3500 miners' inches. One four feet wide and 30 inches deep, on a four per cent grade, is large enough for 2000 inches, while one three feet wide and two and a half feet deep will do for 600 to 1000 inches, the grades and sizes here mentioned denoting those commonly employed.

The following are the rules to be observed in building the sluice as regards mode of construction, size of box, timber, etc.: For sluices four feet wide and upward, one and one-half to two-inch plank; sills and posts, 4x5-inch scantling. To guard against the leakage, the bottom planks should be of half-seasoned lumber, grooved, and a dry pine tongue inserted; bottom and sides spiked together with nails four inches apart; sills from three to four feet apart according to size of scantling used, which is regulated by the width of the sluice. Thus, a four-foot sluice would require a sill seven feet long of 4x5-inch stuff. The posts are halved into the sills and spiked, every second or third post being supported by an angle brace; bottom planks solidly spiked to sills.

To prevent the bottom of a new sluice from being raised by water collecting under it, the flume should be heavily weighted down by loading the projecting ends of the sills with stones. In tunnels, the ends of the sills can be held down by braces extending to the rock above.

The sluice is paved throughout its entire length with wooden blocks and cobbles, the latter selected of a shape and size suitable for the purpose, wooden blocks being always put in at the head of the sluice. The best wood for these blocks is the nut pine of the scrubby species, the

*This article was prepared by the late Dr. De Groot for the Eleventh Report of the State Mineralogist, just issued; but its publication with that of much other valuable matter was prevented by the necessity of revision and omission, so that the volume might be reduced to reasonable limits. It covers familiar ground, but is, on the whole, a complete and careful review of the industry and hydraulic-mining methods. The article has been furnished this paper by State Mineralogist J. J. Crawford.

fiber of which, being tough and long-grained, "brooms up," that is, wears rough, not smooth like oak and other hard, fine-grained wood. These blocks, which are square, 8 to 13 inches long, are set on end in rows across the sluice, each now being separated by a space of 1 to 1½ inches. They are held in place by riffle strips 1½ inches thick by two or three inches wide. These strips are beld crosswise on the bottom between the rows of blocks by the side lining and secured to the blocks by means of headless nails. This lining consists of a heavy plank nailed inside the sluice. Block riffles are sometimes kept in position by driving soft pine wedges between them and the sides of the sluice. Where both rocks and wooden blocks are used as riffles, they are set in the sluice in alternate sections. While the cobble riffle is cheaper than the wooden and saves the gold about as well, it requires more time for cleaning up, also a steeper grade and therefore more water. After each cleanup or run the blocks are turned end for end and replaced in the sluice, their use being continued until they are worn to a length of four or five inches, when they are no longer deemed serviceable. In placing the blocks in the sluice the alternate rows are fitted so as to break joints.

In some instances scantling placed lengthwise in the sluice have been used for riffles, also worn-out "T" rails, the latter being sought after when obtainable on account of their lasting qualities. When built on a curve, the outer side of a sluice requires to be slightly raised, as in the case of the flume already remarked upon. For the form of sluices having cobble pavement and block riffles, see the accompanying illustrations.

The Grizzly.—The first favorable place along the line

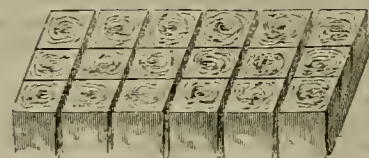


Fig. 2. Sluice with Block-pavement.

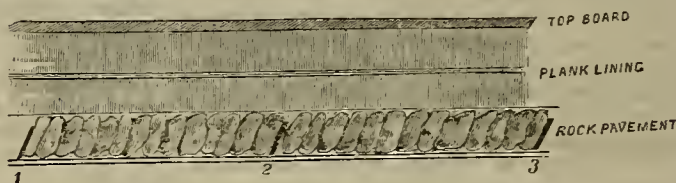


Fig. 1. Sluice-boxes: grade 6 inches per 12 feet; sides 36 inches high; 123—compartments.

of the sluice presenting for the location of one of these contrivances is availed of, such place, because of the peculiar conditions required, being not very common. The grizzly consists of a grate of parallel iron bars placed over the sluice-box, its design being to catch and throw aside such cobbles as come down the sluice that are too large to pass through the interstices between the bars. It is this act of flinging off these rocks after the violent manner in which the grizzly bear is supposed to perform a similar act that gave this device its name. To enable this grizzly of the hydraulic miner to well perform its work, there must be a steep declivity close at hand over which the rocks rolling from it can be precipitated out of the way. Beneath this grating is placed a box for receiving the finer material that drops through it, and which is conveyed to a side sluice and by it carried down and returned to the main sluice.

The Drop.—Whenever, along the line of a sluice or the outletting channel below, there occurs a considerable descent, this is availed of to give the gravel a precipitate fall—in the technique of the miner, "a drop," the object aimed at here being the breaking up and disintegration of the cemented gravel. The higher and more abrupt the drop the better. In some instances the outflowing material is, by a succession of falls, precipitated to an aggregate depth of a thousand feet or more, sluices and undercurrents being set between these falls where this is practicable. Illustrations of the drop will be found in several of the cuts alluded to in the text.

THE returns for the Rand mines, South Africa, are at hand for 1893, showing a total production of 1,478,475 ounces against 1,290,000 ounces in 1892. Six years ago, that is in 1887, the total output was less than 35,000 ounces, of a value of about \$560,000, whereas now the rate of production is over \$25,000,000 per annum. The total production of the world for gold in 1892 was over \$130,000,000, so that the Rand mines are now yielding something like one-fifth of the whole production of the precious metal.

The Regulation of Foreign Petroleum Supply.

The Russian petroleum producers have, at a recent meeting at St. Petersburg, agreed upon the following arrangement: The export of petroleum and its sale on the foreign markets shall be left to a committee of five members, of which three were elected at the meeting, viz., the Caspian Company, the firm of Schibajeff and the manufacturer Unanoff; the other two will be elected at Baku, says *Engineering*. In addition to these five, the union elect a number of selling or commercial agents. For export of petroleum without the knowledge of the committee, the manufacturer has to pay a fine. The part of every member in the transactions is fixed by shares, which are again based upon each 1000 poods of petroleum actually exported

American concern is competing more keenly than ever against the Crescent pipe line, which, especially in France, has proved a thorn in the flesh of the Standard Oil Company. This latter company now intends to undersell the former in France, and has built a store at Rouen capable of handling 600,000 barrels per annum. Sites have further been bought for similar installations at Marseilles, Cette, Bordeaux and Havre. A large depot has been erected in Paris, which is being supplied from Rouen. The Standard Oil Company is thus endeavoring to gain the same footing in France, as it already holds in Germany through the German-American Petroleum Company; in England through the Anglo-American Oil Company; in Holland and Belgium through the American Petroleum Company; in the Scandinavian countries through the Danish Pe-

Opening Day at the Fair.

The accompanying illustration gives a view of the inner court of the Midwinter Fair, Feb. 27th. Though there are marked advantages in the photographic method there are also defects. For instance, while the engraving we use shows faithfully the details of construction and the life that comes from the presence of the multitude, it lacks depth and distance and gives no idea of the area of the ground embraced in it. The distant points of the picture are considerably more than a thousand feet from the foreground while the observer would think them but two or three hundred. Aside from this defect the view is true to the scene. The building in the background is the largest of the group, the Manufactures and Liberal Arts



CALIFORNIA MIDWINTER EXPOSITION—PARTIAL VIEW OF BUILDINGS AND GRAND COURT DURING THE PARADE ON OPENING DAY.

during 1892 from Baku via the Transcaspian Railway. The quantity of petroleum which, according to this scale, will be fixed for each producer to supply, is handed over to the committee of five, who sell it for account of the union. The manufacturer who does not deliver the stipulated quantity is bound to make good the loss arising from such deficiency, unless it is caused by fire or other accident. The commercial agents are under the control of the committee, to whom they have to produce monthly accounts of their dealings. The five members of the committee do not receive any remuneration for their work; they are the honorary representatives of the union.

In order to make this arrangement definite, it is required that representatives for at least 80 per cent of Russia's export of petroleum join the union. So far 60 per cent have joined. Negotiations are at the same time progressing between the Russian petroleum exporters and the American Standard Oil Company about dividing the world's market between them in the following manner: The Standard Oil Company should supply 70 per cent and Russia the remaining 30 per cent of the requirements of the importing countries. While the Standard Trust and the Russian producers are thus endeavoring to compromise matters, the

troleum Company; and in Italy through the Italian-American Petroleum Company.

Electricity in Mining in France.

The Compagnie des Mines de Vicoigne et de Neoux has invited tenders from the principal electrical firms for the laying down of an important installation in its mines. The proposals call for the establishment of a central station, which will provide electric power for the different works throughout the colliery. At present only two dynamos will be put in, of which the electrical force will be utilized at a distance of 4400 meters, for the working of five winding gears of from 6 to 14 H. P. Five pumps, operated by electric motors of 5 H. P., will be placed at the bottom of the mine, and electric locomotives, each of 12 H. P., will be employed for the conveyance of coal, at a speed of 12 klloms an hour, along the principal gallery, which has a length of 2000 meters. The mine will also be illuminated by 26 arc lamps and 200 incandescent lamps, each of 16 c. p. This will be the first installation of its kind in France.

THE Maid and Henriette mines, at Leadville, raise 1,728,000 gallons of water per day.

Building. The building on the right is the Mechanic Arts, of whose size the photograph gives no adequate idea.

The fair is opening well. There is much still to be done before it can be said to be complete, but rapid progress is being made. The patronage thus far cannot be complained of considering the incompleteness of the display and the unpleasant weather which has prevailed. About 125,000 people attended during the first week, and daily attendance since has ranged from 6,000 to 15,000. Visitors seem well pleased and surprised at the extent and variety of the display. Each day takes more and more the aspect of a festival. Countless flags and banners are floating from the staffs, music is playing on the Grand Court and in the big buildings, the crowd of merry-makers grows larger each succeeding day, and everywhere is a scene of recreation and pleasure. After this week not a day will pass without a special fete.

The city has already thousands of visitors. The records of the Department of Admissions show that they come from great distances. News has been received that hundreds are on their way from Arizona, New Mexico and Texas. Boats and trains are crowded on their way to this city from Los Angeles and other Southern points.

Marble Deposits of California.

Abstract of Correspondence in the *California Architect and Building News*.

It is my intention in this review of the different marble deposits of the State, to show no favor to any particular material, but, as near as in my power, to make a fair statement of the various kinds and qualities, where they are quarried, and such other information as I may have, when the purchaser can judge for himself after an examination of the different materials. I do not hesitate to say that if there is a deposit of poor marble being worked in California to-day, I do not know of it. They are all good and will take the place of and, in many cases, give better satisfaction than the imported article.

Inyo County Marble.—Near the base of the Inyo mountains, in Owens valley near the lake of the same name, lie what are, perhaps, the largest and most wonderful deposits of marble that have been as yet discovered. It is impossible to describe truthfully these vast deposits of beautifully colored stones.

There is white, black, blue and yellow in pure colors, purple veined, black and gold, making a grand variety of colored marbles, very beautiful for interior decoration. The white marble is perfectly clear, the grain is fine, very compact and will stand great pressure; it is a pure dolomite, therefore, and will take on and retain a very fine polish.

The first two stories of the Mills building in this city are, as well as a greater part of the interior finish of same, done in this material. It is a most creditable piece of work. The main entrance to the building shows what may be done in the way of relief with the white marble.

The black is almost identical in color with the Belgium black marble; it is very difficult to distinguish one from the other when polished. The yellow marble varies from a delicate cream to a dark mottled orange. There are veins of deeper yellow with fern-like markings, similar to moss agate, and it is particularly adapted for furniture and interior decorations.

Inyo Moss Agate Marble.—The color runs from light to dark lively browns with beautiful fern-like markings, and, I understand, is the only marble of the kind known; it takes a fine polish.

A short time ago I was shown a very large collection of fancy colored marbles (in sample) from Italy, and, at the time, I took pains to obtain from the party the pieces of the different varieties on board the vessel at Genoa, Italy, and also delivered here in San Francisco. I found the prices of these colored marbles were far in excess of the Inyo colored material, and while I must admit that there were some very beautiful specimens of marble in the collection from Italy, I say, without fear of contradiction, that the colored marble of Inyo county is fully up to their standard and, in my judgment, much more beautiful.

Amador County Marble.—Situated about six miles from Jackson, the county seat of this county, is a vast deposit of true marble and what is perhaps the truest material (of the marble family) yet discovered in the United States.

As yet there are but two varieties developed, although the vein is uncovered on the face of the hill for a length of about 275 feet and a height of over 400 feet. This marble is variegated in color, one a gray black vein and the other a pure white with jet black veins. The markings of the variety are similar to some of the Italian marble and are far more beautiful, from the fact of the black veins standing out in bold view, while in the case of the Italian marble of this grade the black veins seem to be beneath the surface and are more of a gray than black. A comparison of the two materials leads to a verdict in favor of the Amador marble. A feature of this material which I have not seen in any marble yet discovered in the United States, is that it is very compact, of great strength when put under pressure, yet very easily worked, saws much better than the Italian, and for relief work is much preferable to the imported material. I have talked with several marble workers about this, and in each case they informed me that the Amador marble worked up better than the Italian. The most prominent piece of work done in this material was the interior work and grand stairway of the Stanford University museum. It is really a magnificent piece of marble work. I am reliably informed that samples of this material have been shown to Mr. Vecchi, one of the largest quarry owners in Italy. He pronounced it equal to the best (outside of the statuary) Italian material, and predicted that it would eventually drive the imported article out of the markets of the Pacific coast. This marble received the highest recommendation from the United States supervising architect, of all the different varieties of stones presented to the Government (in samples) for use in the construction of the proposed postoffice in San Francisco.

San Bernardino County Marble.—Here again we have an immense deposit of marble very different in character from that of Inyo or Amador counties, but, at the same time, it is a very fine material of different varieties. There

is black, dark gray and blue—these are variegated—also pure white. The deposit is situated about one mile from the town of Colton, has excellent railroad facilities and an improved plant of machinery for working the marble into slabs, pillars, wainscoting and tiling. A company was organized some four years ago to work this deposit. Their principal marble job was done in the interior of the new Academy of Sciences building in this city.

I am informed that the property or the business of the company has now passed into the hands of two experienced marble men from the Eastern States, and I understand that these men are fully able to handle the quarries as well as the mill.

San Diego County.—This county also contains a deposit of green marble, a beautiful stone very much the nature of onyx. Some time since, the parties owning these quarries started in to open them. I have seen the marble in the rough and finished. It takes on a beautiful polish and is worthy of a place among the best marbles on the market.

In many of the other counties of this State deposits of fine marble have been discovered. None of them have been opened to any extent and are only awaiting capital to develop them.

The Situation in South Africa.

A correspondent of the *Seattle Post-Intelligencer* contributes the following under date Seattle, Jan. 30th, which will doubtless be of interest to many who have contemplated going to South Africa:

Will you kindly insert in your valuable paper the following remarks in regard to South Africa for the benefit of those contemplating going there?

I sailed from London January 20, 1893, for Cape Town, returning the latter part of May, and was only too glad when I reached the States again. Miners thinking of going to Johannesburg would do better by staying at home, even if times are very quiet here. The average of miners landing in Cape Town is about ten weekly, and they are nearly all from England. They nearly all branch out for Johannesburg, and naturally the employers prefer an Englishman before an American, and you will find this in all branches of business, professional or otherwise. The colored people do all the laborious work in the mines, and, as for the positions the white man would take, I suppose there are about 50 waiting for one opening. A good miner can earn \$25 a week, and I think a good miner can earn more here; and then again, he can live considerably cheaper here. He would have to pay in Johannesburg about \$10 weekly. This is speaking of board alone.

When I left Cape Town last May there were hundreds of men in Cape Town from all parts of South Africa looking for employment. Lots of them manage to get down from the interior, and the first chance they have of returning to England, either working their passage or otherwise, they accept. The boat I came back with to London was the *Tartar*. Eleven worked their passage home. They had to refuse many applications. A stowaway is a common occurrence.

Board in Cape Town is \$6.25 a week, and if you wanted a position as clerk, hook-keeper, telegraph operator, etc., they would offer you what they call "a start." That is to say, it doesn't matter how competent you may be, you have to commence with \$5 or \$6 a week, and you think yourself lucky if you can get that. There are, on an average, 100 applicants for each situation.

I took my brother-in-law from England with me. He was earning there \$10 a week, and he tramped around Cape Town seven weeks, and finally got a position. I have just heard from him, and he is at present earning \$6 a week at the same place.

As many people are returning from South Africa as there are going—that is, between 400 and 500 weekly. Men that do get positions, after they have saved, if ever they do, \$200 to \$400, return to England for good.

Employers will not accept any diploma from the United States of any kind, it doesn't matter how high the reputation of the college may be, and any one heading there will only be too sorry he ever left home, as it costs more to get from there than it does to reach there. The whole thing is, there is too much English about it all round, and after having the freedom of this country you will find a great difference between South Africa and here.

There are two or three prices on some of the necessities in Cape Colony, and this is the cheapest place to live: House rent, from \$5 weekly; flour, 6 cents per pound; potatoes, 30 pounds for \$1; butter, 50 cents to 75 cents per pound; bacon, 35 cents per pound.

FIFTY men are at work at the Champion mine, Nevada City, and the 30-stamp mill is kept running steadily. Splendid rock is being taken out, and the mine looks well. As soon as possible the full force of men will be returned to their former places.

Mines for Idle Men.

An odd means of helping the unemployed was devised by the Government of this colony during the winter just ended, when trade was duller and distress more acute and general than in very many years past, writes the Melbourne correspondent of the *New York Sun*. It consisted in simply and actually presenting gold mines to the unemployed workmen. Not only this, but transportation to the mine was furnished, and also tools to work it, and provisions to last until it began to pan out.

There are scattered through the colony auriferous gullies and streams and old diggings that have been worked out, so far as adequate commercial returns are concerned, but which yet may be made to yield a living to any one who will seek hard for it. The living is not good enough to attract gold-seekers in good times, but at a time like the past winter, when thousands of unemployed men, with dependent and destitute families, walked the streets of Melbourne, glad to get even crusts and crumbs, such a living as the old diggings afforded was one to be fought for.

The Department of Mines sent experts to the old mining regions to ascertain where there would be the most likelihood of the unemployed workmen getting enough gold to afford a living. Some regions that would have yielded fair returns to experienced miners were unsuited for the endeavors of the promiscuous workers, willing but unskilled, who were subsisting on charity in Melbourne. To some of the better of those regions, parties of unemployed were sent in charge of one or two experienced miners. But many places were found where unskilled men might get enough gold from the creeks and rivers to afford what would be to them, under the circumstances, a good living.

About 3000 men were sent out by the Government to these old diggings during the winter, and most of them were accompanied by their families. Free railway passes were provided to the station nearest the place where they were to prospect, and, where possible, further transportation was also furnished. On arriving at the diggings, 30 shillings were given to each man for the purchase of provisions and supplies and also a few simple tools. Experienced miners were on hand to show them how to get to work, and remained in the region so long as necessary. Twenty to fifty and a hundred families were located in some diggings. Most of the districts selected for these settlements were along streams, and here was generally found land suitable for raising vegetables and fruits.

The experiment proved quite a success. Almost all the people thus sent out have been making a fair living. Some have had to work hard with little returns and have needed assistance from the Government, but the great majority have done really well. Some of the men have made an average of 20 to 30 shillings a week all the time they have been at the diggings, which was sufficient to maintain their families in quite comfortable circumstances. Few there are who are not able to make at least a livelihood. Some are now returning to Melbourne and other cities to take up their old lines of work, but a great many are remaining at the diggings, satisfied with their present condition, and doubtless in many cases hoping to strike a rich patch.

The Government also settled about 1800 men, most of them with families, on Government land, under the provisions of an act recently passed for the formation of village settlements and homestead associations and communities. Thirty-five such settlements were plotted out, and unemployed men with their families placed on them, with the means of commencing to obtain a livelihood from the products of the soil. The plan of most of these settlements was that of a co-operative community, and great care was exercised to apportion the unemployed among the 35 settlements so that their individual capabilities might be of the best advantage for the common good. The plan was something similar to that of the Hirsch settlements of exiled Russian Jews in Argentina. All these communities are reported to be doing well, and in but few instances have settlers deserted them. The winter climate in Victoria is, of course, very mild, and in July, the coldest month, it is a rare thing for the temperature to fall to freezing.

Temperature of a Coal Bore.

Prof. David and Mr. Slee, chief Inspector of mines, have ascertained the temperature of the Cremorne coal bore, which is 2927 feet deep, with a thermometer encased in iron, owing to the great pressure of the water, which is 1400 pounds to the square foot, says a Melbourne paper. The thermometer was put down three times. On the first occasion, at 2750 feet, it remained two hours. On the second occasion it went a little lower, and remained down 26 hours; and on the third it remained at nearly the same depth for an hour. The readings ranged from 95½ to 96° Fahr. It is concluded from this that at the bottom of the bore, 2927 feet, the temperature will be 100°.

Scientific Progress.

Science of Weather.

B. S. Pague, weather forecast official in charge of the San Francisco station, delivered a highly instructive lecture recently to the students of the Leland Stanford Jr. University. After giving an exhaustive contemporaneous history of the subject of weather forecasting he said, in part:

Weather forecasting is practical meteorology. It is the applying of all known laws to current conditions and deducting probable results.

Simultaneous eye reading observations are made at all Weather Bureau stations at 8 A. M. and 8 P. M. seventy-fifth meridian time (or 5 A. M. and 5 P. M. Pacific time). These observations, consisting of the readings of the barometer, thermometer, the wind vane, the anemometer, the rain gauge, clouds and deductions for the relative humidity, the character of the weather and any special phenomena that might be observed, are enciphered and telegraphed to selected centers, from whence they are again distributed.

At San Francisco we have reports from Chicago westward, from Texas north to the northern stations of the British Northwest. These observations are entered on charts. Lines connecting places of equal barometric pressure, called isobars, are quickly drawn. Lines connecting places of the same temperature, called isotherms, are next drawn. Then on the second chart are lines drawn to show the changes in the temperature during the past twenty-four hours, and on the third chart are lines drawn showing the atmospheric pressure and lines drawn encircling rainfalls and cloud areas. Thus having the three sets of charts prepared, the forecaster sees at a glance where the pressure is the highest and where the lowest; where the greatest and least changes in the pressure have occurred during the preceding twelve and twenty-four hours, when rain has or has not fallen and when the temperature has increased or diminished the amount of clouds. These are the facts known to the forecaster, and from them he is to deduce the probable weather to come.

The atmospheric disturbances affecting the weather in California usually show themselves first in the north off Vancouver island or off the Washington coast. Some few move from the southwest and first appear off the southwest California coast. These latter, however, are rare.

I would call your attention to the daily weather map published every morning and commend it to your attention and study. A careful perusal of it daily, a study of the constant atmospheric changes noted thereon from day to day would soon enable you to deduce your own conclusions and not be dependent on the official forecasts. Observe the movement of the low pressures or storm centers, the influence that the high pressure exerts from one day until the next, notice the position to-day of a certain isobar and compare it with the same isobar of the day following and you will find yourself interested in the movements and deducing valuable conclusions, ever remembering that a southern deflection of the storm or low area will cause rain in California, while an east-

ern movement of the storm will allow fair weather to continue.

On the Pacific Slope, and especially in California, the dry and wet seasons or periods of the year are more definitely marked. The cause of the wet and dry seasons in summer is because the low pressure or storm center moves eastward at such a high altitude that its influence seldom extends farther south than Washington, and at times not to the northern Washington line. In winter these low pressure or storm centers are deflected south, causing the rains which occur.

The Ideal Source of Light.

We have more than once had occasion to notice the fact that it is only by reason of the enormous wastage of chemical or electrical energy which is incurred under existing methods of generating light that the developments, with a view to the commercial application, of practical optics are retarded or completely hindered in many striking and important directions, says the *Optician*. There are not wanting indications, however, at the present time, that we are within measurable distance of discoveries which may rectify these disabilities, so multiplying a thousand fold the possibilities of serviceable or economical use for mirrors, lenses, and other optical appliances. We hope, and the experiences of the past in such matters warrant the expectation, that when this brilliant achievement is arrived at it may be as a result of inventive and scientific acumen on the part of some professional optician. That by the way, however. We proceed to describe one of the most likely directions in which experimental investigations may lead up to this desideratum.

Without necessarily taking much interest in science of what, we believe, has been called the "beetle hunting" order, it seems probable that the minds of most opticians are specially drawn to, and, so far as maybe, specially familiar with the physiological relationships of light. And it has doubtless been anticipated by the reader that what we here refer to as one ideal, or economically perfect, source of light, is that which is elaborated by nature in glow-worms, fireflies, and other living organisms. It is quite popularly assumed that the phosphorescence of these insects is unaccompanied by the radiation of dark heat. But it is needless to explain the reasons why this apparent absence of heat, from such excessively feeble radiations, might be perfectly consonant with the existence of a relatively well marked heat spectrum.

At this point the matter has been taken up by Prof. Langley, who has proved by most delicate spectroscopic observations that the photometric curve pertaining to the Cuban firefly, *Pyrophorus noctilucus*, lies wholly between the limits .45m and .65m with a maximum at .54m in the yellow-green. It is important to notice that, while the terminations of this photometric curve were sharp at the points just indicated, a solar spectrum formed upon the same scale and, in the gross, of equal brightness (or equal dimness) was readily distinguished between .38m and .75m. Cutting off the mere "body heat" of the insect by means of glass impervious to rays over three microns wave length, Prof. Langley has also plotted the total energy curve for

the firefly radiation, and has thus proved conclusively that what we have here is light practically unaccompanied by heat. In fact the insect-light is produced by an expenditure of little more than one four-hundredth part of the mechanical energy consumed for equivalent illumination in a candle flame.

Now, experiments have shown that warmth increases the luminosity of a dead shining glow-worm (the limits of the glow-worm spectrum are .65m to .518m). Electrical excitation, or immersion in oxygen or carbon monoxide, produce the same effect. And that the phenomenon is one of combustion seems to be shown by the fact that carbon dioxide always appears at the luminous surface, while immersion in hydrogen, sulphurous anhydride, carbon dioxide, sulphuretted hydrogen, or a vacuum, extinguishes the light. It should be mentioned that the integrity of the irregularly polyhedral "luminous cells" (.04 to .06mm thick) is essential to the phenomenon. They continue to shine for some time after the death of the insect, and after removal from it, but if crushed their illuminating power is instantly lost.

What is the remarkable carbon compound which undergoes combustion in these cells, and yields "the cheapest form of light"?

Phosphorescence of Paper.

That ordinary paper is susceptible of marked phosphorescence is an observation which was made by Niepce de St. Victor many years ago, says the *Optician*. The experiment by which this was originally demonstrated was to expose or isolate an engraving for about a quarter of an hour, and then to place it in contact with a photosensitive surface. Even after "dilution," as it were, on transference to a second piece of plain paper or cardboard, by contact therewith in the dark, this stored-up light was affirmed to be still capable of producing a negative impression upon a photographic surface.

Vegetable Photography.

The following appeared in "Notes and Queries" some 20 or 30 years ago: "While any fruit, peach, nectarine, or apricot, is yet in a green state, affix an adhesive label, your initial, or any other private mark to the side exposed to the sun. The ripe fruit thus labeled will carry its unobliterated green stamp into the market. This simple operation, should it fail to preserve the fruit, will at least enable the owner to identify it if stolen." Probably the method referred to is one of the first steps that has been made toward the process of "photographing" on leaves, etc.

Electricity With Gatling Gun.

An electric motor attachment has been applied to the Gatling gun which promises not only to more than double the destructive capabilities of that particular machine, but to effect a great advance in the efficiency of all machine guns. The motor is detachable, is of one-horse power, is very small, weighing but a trifle over 50 pounds, and is placed in the breech of the gun, amply protected. The motor increases the present rate of firing, 1200 shots a minute, to more than 3000 in a minute.

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Production of Colors in Glass.

According to *Die Glashütte*, the beautiful coloring of certain varieties of glass now produced in Germany, and which far excels some of the most noted French specimens, is an art practiced by the glass-blowers at the furnace, by means of an apparatus consisting of a sheet-iron cylinder, 20 inches long and 8 inches diameter, standing vertically, and having a similar cylinder riveted across the top, thus forming a T-shaped muffle. In the lower cylinder is an opening into which an iron ladle can pass; and the horizontal cylinder is provided with doors at either end, the one nearest the operator being so arranged that the blowpipes can be supported, when the door is closed, in a horizontal split running to its middle, the object to be treated being held inside. While the glass-blower is reheating his work for the last time in the furnace, an attendant takes the long-handled iron ladle, which has been heated red hot, shakes into it about a spoonful of a specially prepared chemical mixture, and places the bowl of the ladle quickly in the opening provided for it in the vertical cylinder. The mixture immediately gives off vapor, which rises to the horizontal cylinders, where, meanwhile, the blower has placed his work, supported by the blowpipe, and heated to an even red, turning it rapidly in the vapor; in a short time the object is covered with a changeable luster, is removed from the pipe and tempered like other ware in an ordinary oven, then cut, engraved, painted or gilded, as desired.

Aluminum Boron Bronze.

Mr. H. N. Warren, of Liverpool, England, has been experimenting lately with aluminum bronzes, and has found that the presence of a very small admixture of boron makes a denser and more durable alloy, says the *Scientific American*. This aluminum boron bronze casts and melts well, and is free from some drawbacks met with in working with the ordinary aluminum bronze. Producers of that alloy often complain of the difficulty experienced in obtaining a uniform mixture; for a difficultly fusible alloy sometimes forms on the surface of the molten portion, and, being accompanied by surface oxidation, refuses to alloy with the remainder. The aluminum boron alloy forms at a lower temperature than when pure aluminum is used. In preparing this bronze, Mr. Warren first makes ingots of aluminum containing boron in the same state in which graphite exists in cast iron. These ingots are made by introducing aluminum into a molten mixture of fluorspar and vitrified boric anhydride, which has been heated in an oxy-hydrogen furnace until fumes of boron fluoride appear. The boron is immediately reduced, and it dissolves in the aluminum, and the aluminum is rendered crystalline and brittle thereby. When added to copper in the proportion of five to ten per cent, it forms the aluminum boron bronze in question, which is not brittle. The effect of boron on this bronze would appear to be quite different from that of silicon, which generally ruins all bronzes when present even in minute quantities.

Smoke-Preventing Laws.

The last Legislature of Massachusetts passed a law regulating the smoke nuisance in the large cities. This law provides that in cities of over 300,000 inhabitants, after July 1st of the present year, no person should use bituminous coal for the purpose of making steam in boilers in any building, unless the furnace in which said coal is burned is so built or equipped that at least 75 per cent of the smoke is consumed or otherwise prevented from entering the atmosphere. The penalty was fixed at not less than \$10 nor more than \$100 for each week during which the violation of the law

should continue. In commenting on this, a scientific writer says it is hoped that other States will enact similar laws. It is an easy matter to prevent the smoking of furnace fires, and there is also economy in burning the smoke, which, as everybody knows, is composed of fine coal, which is allowed to escape before it has been properly acted upon by the oxygen of the air.

Process for Coking Dry Coals.

Mr. G. C. Hewett of Washington, D. C., is the inventor of a process for making coke from dry coals and lignites. In describing his process his claims state that during the ordinary process of coking coal which produces a hard, strong and cellular coke, the coal becomes semi-fused and soft, or cokes, in the early stages of the operation, when gases are being evolved freely, and it is this evolution of gas in the soft mass that gives the proper cellular structure to the coke. On the other hand, when a dry coal or lignite is heated, as in the ordinary process of coking, there is no softening of the mass of coal during the evolution of the gases, and no true coke is formed. Mr. Hewett holds that the failure of the many processes for making coke from non-coking coals was caused by the premature evolution of gases during the heating, and that there is consequently no opportunity for the coal to cake. He claims to have also discovered that, by retarding the evolution of gas when the coal is first heated, changes take place in the constitution of the coal which allow it to cake, and a good quality of coke can be produced from a coal that would otherwise yield no coke. His invention consists in bringing about certain changes in the constitution of non-coking coals by heating them at a low temperature under pressure, and thereby giving them the property of caking and then coking them by the ordinary process.

Two Novel Locomotives.

Two engines, built upon what is termed the revolving reaction principle, have been erected, from designs by Alexander Morton, in the works of Messrs. Campbell, Smart & Co., Old Dumbarton Road, Glasgow, says the *Journal of Commerce*. One engine is connected with a large Shiele fan and the other with a high-speed dynamo. It is stated that the former runs at about 1200, and the latter at about 4000, revolutions per minute, with little or no vibration, notwithstanding the fact that both engines are simply lying on a table without securing bolts. The principle upon which they are constructed is that of the oldest engine of which there is any account—the revolving millipede described by Hero of Alexandria, at least 200 years B. C.—which is described as having been an outward flow reaction engine with two diametrically opposite nozzles projecting from a small central globe revolved by the reaction of the steam from the two nozzles at a tangent to the circle.

To Extract Gutta-Percha.

M. Rigole is reported to have discovered a process for extracting gutta-percha from the leaves and twigs of the *Isonandra dichopsis*. It is claimed that this process will insure an unlimited supply of gutta-percha in a few years' time, as it allows of the trees being utilized continuously during the whole period of their existence, instead of being cut down and destroyed for a single yield of gutta-percha, as is now the case on an estate in the Island of Pulo Obin, near Singapore.

Novel Fire Engine.

The Berlin fire department is experimenting with a novel fire engine. The carriage is constructed entirely of papier-mache, all the different parts, the body, wheels, poles, etc., being finished in the best possible manner.

Useful Information.

Effects of Trees on Climate.

As to humidity of air, we find that the annual evaporation within the forests is about one-half of that in the open field; not only is the evaporation within a forest greatest in May and June, but the difference between this and the evaporation in the open field is also then a maximum, which is the saving due to the presence of the woods, says Prof. B. E. Fernow in *Manufacturers' Gazette*. The average annual evaporation within the woods is about 44 per cent of that in the field. Fully half of the field evaporation is saved by the presence of the forest.

The quantity of moisture thrown into the air by transpiration from the leaves in the forest is sometimes three times that from a horizontal water surface of the same extent, and at other times it is less than that of the water. The transpiration from leaves in full sunshine is decidedly greater than from leaves in the diffused daylight or darkness. The absolute amount of annual transpiration observed in forests of mature oaks and beeches in central Europe is about one-quarter of the total annual precipitation.

The percentage of rainfall evaporated at the surface of the ground is about 40 per cent for the whole year in the open field and about 12 per cent for the forest, and is greater under deciduous than under evergreen forests. The evaporation from a saturated bare soil in the forest is about the same as that from a water surface in the forest, other conditions being the same. The presence of forest litter like that lying naturally in undisturbed forests hinders the evaporation from the soil to a remarkable extent, since it saves seven-eighths of what would otherwise be lost.

The total quantity of moisture returned into the atmosphere from a forest by transpiration and evaporation from the trees and soil is about 75 per cent of the precipitation. For other forms of vegetation it is about the same, or sometimes larger, varying between 70 per cent and 90 per cent; in this respect the forest is surpassed by the cereals and grasses, while, on the other hand, the evaporation from a bare soil is scarcely 30 per cent of the precipitation.

The absolute humidity within a forest exceeds that of the glades and the plains by a small quantity. The relative humidity in the forest is also larger in the forest than in the glades or plains by two to four per cent. Forests of evergreens have from two to four times the influence in increasing relative humidity than do forests of deciduous trees. The gauges in European forest stations catch from 75 to 85 per cent when placed under the trees, the balance representing that which passes through the foliage and drips to the ground or runs down along the trunks of trees, or else is intercepted or evaporated. The percentage withheld by the trees, and which either evaporates from their surface or trickles along the trunk to the ground, is somewhat greater in the leafy season, though the difference is not great.

Deciduous and evergreen trees show but slight differences in this respect. More rain is usually caught by gauges at a given height above the forest crown than at the same height in open fields, but it still remains doubtful whether the rainfall itself is really larger over the forests, since the recorded catch of the rain gauge still requires a correction for the influence of the force of the wind at the gauge. In such cases, where over a large area deforestation and reforestation have seemingly gone hand in hand with decrease and increase of rainfall, the possible secular change in rainfall must also be considered.

Telephone Patent Expires.

A dispatch from Washington announces that the patent upon that part of the telephone instrument which is called the re-

ceiver expired on Jan. 30th, so that the implement may become public property. Anybody can use it, and it is possible to construct a telephone system by which this implement can be employed both for the purpose of transmission and receiving, as in its cruder form it originally was.

Ventilation.

The healthy atmosphere in a room is one in which the air is changed to the extent of three thousand cubic feet per hour per adult inmate, says the *Contemporary Review*. The air admitted need not be cold; warmed air, so long as it is fresh, is, of course, preferable to cold air in winter, but in some way the air must be brought in if we are to continue in health. There are various ways of doing this. One is by admitting cold air, so that it is directed upward toward the ceiling, where the air of the room is at the highest temperature; the cold stream is then heated in its passage as it falls to the lower level for breathing. But in large rooms, to utilize at its best this current, there should be in the skirting outlets communicating with a heated up-cast flue, which will draw away the heavy air near the floor, in cases where there is heating by hot water coils, the cold air may be brought in at or near the floor level, and passed through the hot water coils—the outlet for ventilated air being in or near the ceiling—to a heated up-cast flue. In larger rooms or buildings for public assemblies, it may be necessary with either of these systems, to use a fan either to propel fresh air into the room or to draw away the vitiated air.

The great desideratum in the admission of fresh air is cut it up into very fine streams, something in the way water is cut up in passing through the fine nose of a watering can. It has been found that air admitted through a tube or orifice of equal sectional area throughout enters as a cold draught; but if the inlet be through a series of small truncated cones, the smaller section outward, the larger inward, with a wire gauze on the inside, the current is so cut up and diffused that the draft is not felt. By analogy a mass of water entering through a narrow canal, drives all before it, and cuts a channel for itself, but the same quantity passing over a large surface of ground irrigates it. Another important point is not to let the passage of the air be too great a velocity; the gentler the flow the better.

Keeping Warm.

It may not be generally known that, when exposed to severe cold, a feeling of warmth is readily created by repeatedly filling the lungs to the utmost extent in the following manner: Throw the shoulders well back, and hold the head well up. Inflate the lungs slowly, the air entering entirely through the nose. When the lungs are completely filled, hold the breath for ten seconds or longer, and then expire it quickly through the mouth. After repeating this exercise while one is chilly, a feeling of warmth will be felt over the entire body, and even in the feet and hands. It is important to practice this exercise many times each day, and especially when in the open air. If the habit ever becomes universal, then consumption and many other diseases will rarely, if ever, be heard of. Not only while practicing the breathing exercise must the clothing be loose over the chest, but beginners will do well to remember, in having their clothes fitted, to allow for the permanent expansion of one, two, and even three inches which will follow.

Whalebone from Hair.

A process of forming artificial whalebone from animal hair, consisting in subjecting hair to a softening bath, then to a bath of acetic acid, and finally placing the mass under great pressure, has been invented.

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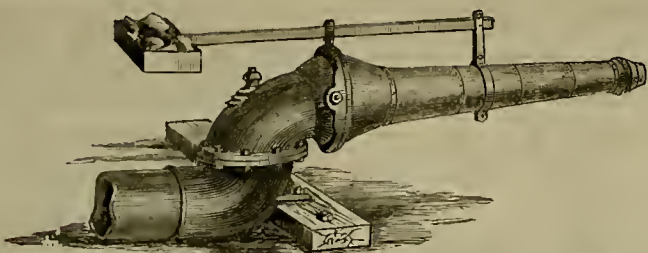
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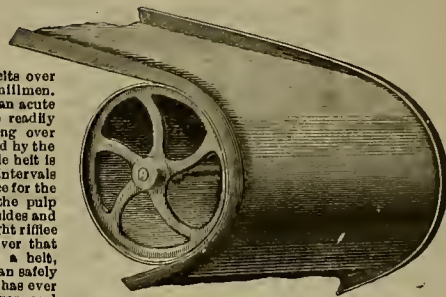
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Electricity.

Electric Vibration Regulated.

Scientific men have gathered in New York in considerable numbers, writes Holland, the correspondent of the Philadelphia Press, and much that is of interest and one or two things of perhaps the highest importance has been developed at the meetings which these scientific gentlemen have held. Perhaps the most interesting comments are those which followed the delivery of a lecture to a large number of electrical scientists by Prof. Pupin of Columbia College recently.

In the lecture delivered by Prof. Pupin, he showed the results of the months of careful investigation and patient study which he had given to this subject since the brief facts of his discovery were first published, and it was with something of amazement and delight, as well as with many earnest comments as to the effect of this new development of electric force upon the commercial use of electricity, that this lecture was received.

One of the finest evidences of the genius of Joseph Henry was his suggestion of the oscillating vibration of the electric current under certain conditions. Henry, experimenting with the Leyden jar, noticed that a magnetic needle which had been placed in the cellar beneath the room where these experiments were conducted was very strangely affected, it being within what the electricians call the field of electricity. The north pole of that needle was so affected that its position was reversed from the normal, a fact which greatly puzzled Prof. Henry, and which he afterward explained on the supposition that the electric current was oscillating. He proved it, and while the discovery is of no popular interest, it was regarded by scientists as a most important one in that day of early electrical investigation.

It is a development of this suggestion of Prof. Henry's which Prof. Pupin has discovered—such a development as gives him the rank of one having high authority in the field of electrical investigation, although it is too early to say precisely what the commercial developments of this discovery may be. A technical description of it would be impossible in a brief article designed for general reading, but a suggestion of it can be made by the use of comparisons. Pupin, through certain mechanical appliances, is able to control, to regulate electric vibration exactly as he pleases. To use a common term, he can slow up or increase speed, producing exactly the vibratory influence that he desires.

By the use of a second system of mechanical appliances, placed within reach of the deductive influences of the first, he is also able to procure vibratory results which completely harmonize with those developed in the first system. By applying a telephone to this second instrument, any sound which Pupin desires to produce is emitted by the telephone. For instance, if he desires to produce the tone which is caused by striking of the C key upon the piano, he is able to regulate these systems so that the number of electrical vibrations is exactly equal to the number of air vibrations, which cause that tone to be carried to the sense of hearing.

Some of the tones produced by these experiments are exquisite; some of them are discordant, some of them of harmonic suggestion, and it is possible to procure electrically induced tones exactly similar to every sound sensation perceptible to the human ear.

The relations of these two systems to one another in their effect upon the sense of hearing may, perhaps, be best illustrated by suggesting those things which are done when the violin and piano are brought to a common pitch, which means that, the proper note, being struck upon each of these instru-

ments, the identical pitch tone will be delivered by them. The vibrations in that case are carried through the air or ether. Pupin's two instruments have something of this relation to one another. Corresponding and exactly measured vibrations are produced at the will of the operator, causing the same identity of pitch tone which is procured when the piano and violin are, as the musicians say, tuned. Pupin "tunes" his electrical machines.

Effect of Electricity on Steam.

At a recent meeting of the Royal Society of Great Britain, J. J. Thomson described the following experiment, showing the effect of electricity on steam: A current of steam was passed through the middle limb of a T tube, the closed side limbs of which were furnished with delivery tubes and also with gold or platinum electrodes, between which sparks might be passed through the steam. The delivery tubes conducted the gases into two eudiometers, in which the gaseous mixture formed on passage of the sparks was exploded. When the sparks were from 1.5 to 4 millimeters long it was observed that within the limit of error of the experiment the volumes of the excess of hydrogen in the one tube and of oxygen in the other, which remain after the explosion of the mixed gases, are respectively equal to the volumes of hydrogen and oxygen liberated in a water voltmeter placed in series with the steam tube, and that the excess of hydrogen appears in the tube which is in connection with the positive electrode, the excess of oxygen in the tube which is in connection with the negative electrode. When the spark length is greater than 4 millimeters, the first of the preceding results ceases to hold, and when the spark length is increased to over 11 millimeters, the excess of hydrogen, instead of appearing at the positive electrode, changes over to the negative, the excess of oxygen at the same time going over from the negative to the positive electrode. When the sparks are very much longer, about 22 millimeters, reversal again takes place, the hydrogen appearing at the positive electrode. The author finds that when the arc discharge passes through hydrogen and oxygen respectively, the hydrogen behaves as if it had a negative charge, and the oxygen as if it had a positive one.

Ingenious Surgical Device.

A very ingenious apparatus has been devised by Dr. Edward J. Birmingham, surgeon of the New York Throat and Nose Infirmary, for controlling the Edison current so that it can be used direct for galvanic cautery operations. According to his own description of the apparatus, it consists of a rheostat, made of coils of iron wire and a handle. The peculiarity of the handle consists of its having solid conductors, and the circuits, therefore, always closed. It is at all times during the operation under the control of the operator's thumb, and the current can, it is stated, without producing an arc, be cut off from or allowed to pass to the knife instantaneously.

Oil and Electricity.

The improvement of oils of inferior quality, by means of the electric current, forms the subject of a communication recently made to the Paris Academy of Science, describing the results obtained in this direction by M. Levat at the Aix Ecole des Arts et Metiers. After detailing the results of his experiments with olive oil, he described those bearing upon lubricating oils of inferior quality, containing at least five per cent of free acid. He found that the acidity always diminished in the minimum proportioned of 1.5, and by subjecting the electrolyzed oil to a second operation, he was enabled to diminish the acidity to 3.10.

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Table of Contents:

Preface; Introduction; Implements; Assay Balance; Materials; The Assay Office; Preparation of the Ore; Weighing the Charge; Mixing and Charging; Assay Litharge; Systems of the Crucible Assay; Preliminary Assay; Dressing the Crucible Assay; Examples of Dressing; The Melting in Crucibles; Scorchification; Cupellation; Weighing the Bead; Parting; Calculating the Assay; Assay of Ore Containing Course Metal; Assay of Roasted Ore for Solubility; To Assay a Cupel; Assay by Amalgamation; To Find the Value of a Specimen; Tests for Ores; A Few Special Minerals; Solubility of Metals; Substitutes and Expedients; Assay Tables.

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Mining Summary.

The following is mostly condensed from journals published in the interior, in proximity to the mines mentioned.

CALIFORNIA.

Butte.

BULLION MINE.—*New Era*, Feb. 8: The Bullion mill dropped its stamps for the first time on Monday. Everything worked well and the crushing of ore was immediately commenced. Of course, as with all new machinery, some adjustments had to be made, but, taking the weather and everything into consideration, the mill worked to a charm. The bins are full of ore and the mill will be kept constantly running night and day.

A RICH STRIKE.—*New Era*, Feb. 8: A rich strike was made in a shaft being sunk to tap a quartz ledge, about three-quarters of a mile southeast of Forbestown, on Saturday afternoon last. The ledge mentioned is owned by W. Bachmar and A. Basgalapi. They have been at work for some time sinking the shaft, and on Saturday, at the depth of 30 feet, struck the ledge. The first piece taken out showed free gold in considerable quantity, and all the rock taken out during the day was speckled with gold, and also showed considerable sulphurete.

THE DENVER MINE.—*New Era*: The Denver mill has had a steady run since it commenced, about six weeks since, and good results have been obtained. C. D. Lane has purchased the interest of Mr. Lagne in the mine and mill, and they are now owned by Messrs. Price & Lane. It is reported that the capacity of the mill will soon be increased by an addition of ten stamps, making a 20-stamp mill of it.

THE GOLD BANK'S NEW WORKS.—*New Era*: Saturday we paid a visit to the site of the Gold Bank's new air-compressors. The house for covering the plant is about finished, and the workmen are engaged in placing the machinery in position. Everything about the works is very substantially built. The cylinders for receiving the air are in position, and the big fly-wheel ready to be put together. The water pipe which is to furnish the water for the power is laid, as is also the pipe which will conduct the compressed air to the place of operation, but from the magnitude of the work we were unable to obtain an estimate as to the time it will require to complete the works, but were informed that it would be pushed with all possible speed. The works are situated on Forbes' ravine at the junction of Mosquito creek, about one mile from town.

Calaveras.

THE CAMPBELL TO RESUME.—*Prospect*: We learn that operations are soon to be resumed on the Campbell mine on Indian creek. Parties have taken hold of the mine and will endeavor to find out what there is in it. The rock was very rich in places, and the only reason for closing it down was a lack of money to properly open the property. Those who worked in the mine have great faith in its ultimate richness.

THE NORTH STAR.—*Chronicle*: Work is progressing favorably at the North Star hydraulic in Happy valley. A large derrick is now being erected for the purpose of banding the rock in the mine, and a cut is being blasted out in order to extend the flume four boxes more. After the water had been turned on a few days last week a sort of "prospecting" clean-up was made of a few boxes, the result of which far exceeded the expectation of those interested.

El Dorado.

MINA BONNAN.—*Sentinel*: A company has bonded the Willis Gould mine above Iowa Hill, and will proceed to develop the property. They will run the tunnel in about 100 feet farther, and also push the work of crosscutting. The bond is for the period of 60 days, and, if at the end of that time the prospects warrant it, they will purchase the property. A contract has been let, and work will be speedily pushed. The mine is looking exceptionally well, and shows good chances of becoming a dividend-paying property. The gravel is similar to that found in the Morning Star mine.

Humboldt.

ALL IN OPERATION.—*Blue Lake Advocate*, Feb. 8: Miners on the Trinity are as busy as bees just at this time. The plentiful supply of rain that has fallen has provided enough water, and more than enough. However, there have been few if any cleanups, so that they are yet in ignorance of the results of their operations. A China Flat mining man, writing to the *Advocate* under date of the 29th ultimo, stated that the outlook for an exceptionally good season's run was never better; that the owners of claims, while sadly in need of capital to do as they would like to do, are perhaps better prepared to go ahead than the mining season usually finds.

The ditch of the Quimby mine slid out a couple of weeks ago, and that claim ceased operations temporarily. Mr. Thomas Dungan, who has a valuable mine on Trinity, is in eager pursuit of the single standard, and Mr. A. N. Foote is doing likewise. Mr. J. J. Moston, who has been negotiating the past two years for the transfer of a number of good Trinity mines to San Francisco capitalists, is still at work on his big ditch. It is learned that three or four Chinese claims are in operation this side of Hawkeye Bar. Schutze & Coon's mine, a short distance above the mouth of the south fork, is also in operation. There have been few prospectors on the Trinity lately, but an unusual and undesirable profusion of the tramp element, hailing from the scene of operations on the big La Grange ditch.

The snowfall varied from three inches along the south fork to three feet on the mountains.

From Captain Curran it is learned that there is too much water in Three creeks and Willow creek for anything in the way of mining to be done in the beds of those streams.

Mr. Johnnie Brett, who got in from China Flat Monday evening, supplies the information that some of the mines, in view of the fact that only occasionally is there plenty of water, are running both night and day.

Inyo.

MINING EXCITEMENTS.—*Register*, Feb. 10: The town has enjoyed a couple of mild pulsations of excitement since our last issue. The first was caused by the reported discovery by Ruellas and others of the long-lost "Frenchman's mine," in the mountains west of Wetson's ranch, and seven miles south of town. This mine was worked many years ago, and the present locators found upon it an old windlass over a 50-foot shaft. The ledge is said to be six feet wide, but as to its richness there is no satisfactory information at hand. The second stir was created by a rush for a three-foot quartz ledge in the hills six or seven miles west of here, and a mile or so south of Bishop creek. This ledge crops out east of the old Freeman and Coats workings in the same section. The ledge is clearly defined, and the croppings present the appearance of pay ore. Some rich gold float has been found in that locality from time to time, but the lode from which the float came has not been found, unless this present prospect should prove to be its source. Quite a picturesque race took place between John Black and Charley Levy for the location. Apparently there is plenty of mineral ground there, as several locations have been made already.

Mariposa.

RICH ROCK.—*Gazette*: Some very rich rock is being taken from the mine below town. This mine was worked many years ago, when the big mill was in good condition, and it was then known to be rich. But the mine has been idle more than a quarter of a century, and all the old works have fallen into decay.

Nevada.

COE MINA BONNAN.—*Telegraph*: Friday afternoon the Coe mine was bonded and work will be commenced as soon as possible. Messrs. Turner and Bennett bonded the property for parties in St. Paul, Minnesota. The company have plenty of capital and will use it in developing the mine to its fullest extent.

CONTRACT LET.—*W. C. D. Body of Grass Valley* has been awarded the contract to rebuild the hoisting works at the Idaho mine. The new building will be about on the same plan as the one destroyed by fire a few weeks ago.

Placer.

LOOKING WELL.—*Herald*: The Boulder mine at Ophir is looking exceptionally well. The Eclipse has changed management and workmen are now engaged in pumping out the water prior to working the claim.

FOR DITCH WORK.—*Herald*: George Geisendorfer & Sons have commenced a large contract of tunnel and ditch work for the S. Y. Water Co., near Weimar.

PAYING WELL.—*Michigan Bluff Cor. Sentinel*: The Frissell mine, formerly the Morehead mine, is reported as paying handsomely. It is to be hoped that it will long continue to do so, as the superintendent pays the highest wages and is opposed to any reduction.

F. W. LEMENT AND G. W. HOFFMAN, of this place, have taken a contract to run 100 feet of tunnel in the Washington mine at Deadwood, at \$10 per foot.

SUBPANNAN WORK.—*Georgetown Gazette*, Feb. 8: J. H. Pege, who has been engaged in driving the bedrock tunnel to open up the Wilton gravel mine under Cement Hill, has suspended work under unavoidable circumstances. Mr. Pege's reputation as a bedrock gravel miner in Placer county stands among the best.

O. P. WILLIAMS OF THE PENNSYLVANIA SLATE QUARRY, Kelsey district, was in town Tuesday. This company started up operations last November, and will soon have things in shipping order. The quality of this slate is of the very best. The company consists of Messrs. M. G. and Grif. Jones and O. P. Williams. They have leased the land from Mr. Hanley.

An important strike of rich gold-bearing quartz was made this week near the Brown mine, south of the Taylor, by the Dacon Bros. and Sam Collins.

Plumas.

THE PLUMAS IMPERIAL.—*National Bulletin*: Under the direction of Supt. Thomas, the work of constructing the rock dam across Rock creek is progressing favorably. The structure is about 50 feet long and in a narrow gorge, with a solid rock foundation. Nine men are employed blasting rock and putting it in place. The site is a very favorable one for building a permanent dam and thus making a large reservoir for impounding debris from the hydraulic mines above, which will be operated as soon as the dam is finished and the mine gotten ready for work.

SINKING BEGUN.—*National Bulletin*: Last week the sinking of the shaft to tap the Elizabethtown channel under the Kellogg ranch was begun, but, owing to the incapacity of the old engine in use, work had to be suspended a few days. The engine from the Lee Bros.' sawmill will be substituted. It has been taken to the Greenville foundry in order that the cylinder might be "bored" out. When this machine is put in place, work will be resumed. Everything will be in good shape for rapid and effective work. A good start has been made on the shaft. It is now down about 12 feet, and there far there has been but little water to contend with. It is thought the shaft will have to

be sunk in the neighborhood of 100 feet to reach bedrock. Some drifting may then be necessary to reach the center of the channel, which is considered one of the richest in this part of the State.

San Bernardino.

LOOKING WELL.—*Shaft*: The Bronze is looking splendidly now. A good deal of work is being done on it, and it is being done in a scientific manner. The company are to be complimented for the excellent judgment shown in the selection of Mr. Charles Saurhrey for foreman, and they are to be congratulated because of the fact that he is in their employ.

AT CAMPBELL'S.—*Shaft*: Active operations in sinking were commenced at the Boomerang on Tuesday morning. Foreman McAdams, having received orders to prepare for sinking, got to work as usual and kept at it night and day until everything was ready, and then work was commenced with three shifts. Shaft No. 2 has been straightened at the 200-foot level, where the vein left the angle that it had been following and became vertical. It is expected that each shift will do over a foot of work. At the mill everything is progressing rapidly. The battery frame has been erected, the foundation for the engine has been laid, and the engine is in place. The foundation for the boilers is now being laid. The large water tanks, three in number, have been erected. The road to the mines is being graded, and will very soon be completed. Large crews of men are kept at work under competent foremen, and consequently much is being accomplished.

Siskiyou.

ABUNDANT WATER.—*Yreka Journal*: The quartz mills in the Salmon river section, and the hydraulics, are all in operation, with an abundance of water for the power wheels and giants to last until late in the summer, and good returns are anticipated. The great amount of rain and snow this season up to date on the high mountains will enable the millmen to keep the mills running until later than the average time for resort to the steam power. We have two months more winter yet, to add to the snow on the mountain peaks, which affords a good fountain in keeping the little streams well supplied with water by the melting snow under the beat of the sun and during warm spring showers.

The lessee of the McConnell & Quinne claim at Klamath river, near the mouth of Humboldt creek, has an eight-horse power engine on the ground, and is busily engaged in making preparations to commence active operations as soon as the river is down to its normal stage or summer level. This engine will probably be stout enough for the hoisting derrick and pump, and run the dip wheel by the current or construct a ditch for keeping the sluices supplied to wash the gravel from bedrock.

The Pokegema Mill Co. intend rafting lumber down the Klamath river to the various mining companies for the construction of wing-dams, water-wheels, etc.

NEVADA.

Washoe District.

SUMMARY OF COMSTOCK OPERATIONS.—Superintendent Lyman's official letter from the Consolidated California & Virginia mine for the week ending Feb. 9th contains the following: "1650 level.—In our workings and from the drift run north from the foot of the upraise which was carried up from the sill floor of this level, we have extracted a few tons of ore of average assay value. The drift running from the east crosscut No. 1 from the drift run north from the winze (down 52 feet), at a point 40 feet north from the winze, has been advanced 19 feet; total length, 217 feet; face in porphyry and some quartz. At a point 20 feet back from the face, in prospecting upward, have extracted a few tons of ore assaying \$25 per ton. The east crosscut No. 2 from the drift run north from the winze (down 52 feet), at a point 126 feet north from the winze, has been advanced 10 feet; total length, 107 feet, terminating in porphyry formation. Total quantity of ore extracted from all parts of the mine was 45 carloads—about 43 tons—mostly from our workings near the winze (20 feet down); average assay value, \$33.20 per ton. The southwest drift (the Rule drift) from the 1000-foot station of the Con. Virginia shaft has been advanced during the week, in the same course which has heretofore been followed, a distance of 62 feet; total length, 580 feet; the face is in a formation of porphyry, clay and quartz, which carries a small assay value. A distance of 45 feet now intervenes between the face of the drift and the point where connection will be made with the drift which is coming from the Best & Belcher side. That drift has been reopened to a point 20 feet within the Con. Virginia ground, leaving 200 feet more to be repaired to meet the Rule drift, and it is now making good progress toward the connecting point."

In the Ophir mine, on the 1465 level, the north drift is in 124 feet. The face is in porphyry, clay and a little quartz carrying a small assay value. An advance of 61 feet has been made during the week in reopening and re timbering the central tunnel, making the total length of the drift reopened from its mouth 506 feet. Have continued jointly with the Mexican Company the work of making repairs to the main shaft. In the Mexican mine, on the 1465 level, the west crosscut from the south drift from the top of the raise 45 feet up is in 207 feet. The face is in porphyry carrying clay separations. On the 900-foot level of the Union shaft the Union Consolidated and Sierra Nevada joint east crosscut from the north drift from the joint west drift is in 45 feet and has been passing through tough clay. The Sierra Nevada south drift from the intermediate tunnel in Cedar Hill is in 416 feet and the face is in hard porphyry. In the Andes mine west

crosscut No. 3 from the north drift on the 420 level has been advanced 10 feet in quartz of nominal value.

In the Best & Belcher mine the east crosscut on the north boundary, 900-foot level, is in 328 feet, and the face is in hard porphyry. On the 1000 level the northeast drift, which was run from the main north drift, has been cleaned and repaired 126 feet; total length 140 feet. Have done some repairing on the 400 level during the week. In the Gould & Curry mine, on the 200 level, the west crosscut, started in northwest drift, 432 feet from the main west drift, has been advanced 10 feet; total length, 882 feet; face in hard porphyry.

In the Hale & Norcross mine they continue to stoop out ore from the winze below the 1300 level, and extracted during the week two cars of ore assaying \$35.15 per ton per car sample, and 26 cars of ore; average assay per car sample, \$20.63 per ton. In the Chollar mine they are reopening the main incline below the 930 level. Extracted and sent to the mill the past week 163 tons and 400 pounds of ore from the 100 level. Milled during the week 150 tons. On hand at mill 73 tons and 800 pounds. Average battery assays, \$20.51; average car-sample assays, \$21.41. Shipped to the United States Mint, Carson, 446 pounds of crude bullion. In the Potosi mine the south drift on the 450 level is out 103 feet, face in clay and quartz. In the east crosscut, 300 feet south of the north line, 750 level, no work has been done on account of making repairs to the south drift, which are completed, and work resumed in the crosscut Saturday. Are yet engaged in making repairs to the south drift on 930 level. In the Bullion mine the west drift from the station, 820 level, Ward shaft, is out 525 feet from the shaft; face in clay and porphyry. At the old Alpha shaft they have finished repairs to the hoisting frame. The shaft is retimbered a distance of 70 feet below the surface. In the Alta mine they have advanced the upraise 30 feet; total height, 30 feet above the track; face all in quartz yielding low assays. Stopping above the 725 level, west of track, following a stringer of good ore; saved about three tons; assay value, \$40 per ton.

Ferguson District.

FULL OF PROMISE.—The Ferguson district, although in the incipient stage of development, gives abundant promise of becoming a great gold producer, says W. S. Godbe. Large shipments of gold quartz are now being steadily made by teams to Milford, 150 miles distant, and thence by rail to Salt Lake, the proceeds of which, after deducting hauling and smelting charges, still leaves a margin of profit to the mine owners. The last few carloads sent to the Monitor netted at the mine \$75 per ton. The quantity of second-class ore already uncovered, carrying from \$20 to \$60 in gold per ton, is undoubtedly great, and, with suitable milling facilities at or near the mine, would yield large returns.

The opportunity for the district now is to secure the largest and richest of the mines, such as the Monitor, Jimcrow, April Fool and Magnolia, and provide adequate means for the cheap transportation and reduction of their ores, which the present owners are unable to do. An 80-stamp modern mill would not be too large to begin with, the returns from which would be such as to warrant more of similar capacity. The district is entirely new and very extensive. It is there that we look for the silver, or, rather, the golden "lining" to the dark cloud that at present obscures our horizon.

Silver Star District.

RASUMEN SINKING.—*Walker Lake Bulletin*, Feb. 7: Ed Brown has resumed sinking the Herd Scramble mine. He is now down over 20 feet. There is seven feet of solid ore in the bottom. The grade of the ore seems to be improving.

Frank Pedrazzi has over three feet of \$50 ore where he is sinking.

John Fleming and company have three men at work, and their ledge shows between three and four feet wide of \$60 to \$75 ore.

The Orphan Boy, belonging to the same company, continues to show well. It has three feet of \$40 ore.

Grassie's Julia mine is considered to be a bonanza.

The Fottler mine, belonging to Douglass & Co., is showing up big in high-grade ore.

E. Dunlap's prospect is showing up a large vein of \$30 to \$40 ore.

There are about 50 men in the diggings.

Tom Pepper owns the springs and is going to build a large reserve reservoir.

The camp has been named Douglass, in honor of the recorder, W. J. Douglass.

The mines are eight miles from Soda Springs and 12 miles from Rhodes.

OREGON.

GOOD FOR PLACERS.—*Jacksonville Times*, Feb. 11: The weather is propitious for the placer miners and they are in a happy frame of mind. The prospects for an extended run are good.

Lewis & Hampton, who own the Dyserf placer mine in Grave creek district, have a sawmill of their own in operation, getting out timber to flume a 15-mile ditch. This will prove to be valuable property.

Jas. McDonough of Tolo, while in Jacksonville a few days since, exhibited some rich specimens of quartz which he had picked up at his placers near Fort Lane. These mines are just below the McDonough ledge, from which considerable gold has been taken in days gone by.

T. J. Chapman, receiver of the Hammerly mine, is in town to-day and brought with him between \$1100 and \$1200 worth of amalgam, the product of the mine from a run of a few days. Mr. C. is now engaged in fixing up the mill for another run, and has nine men employed at the mine.

Notices of Recent Patents.

Among the patents recently obtained through Dewey & Co.'s Scientific Press U. S. and Foreign Patent Agency, the following are worthy of special mention:

TICKET AND TIME-TABLE HOLDER.—Faxon D. Atherton, San Francisco. No. 513,749. Dated Jan. 30, 1894. The object of this invention is to provide a convenient device with independent concealed and open compartments, for the purpose of containing a ticket which may be easily removed from the concealed compartment, and for containing a time table in the open compartment through which the face of the table is constantly exposed. It consists of a case of leather or other suitable material having a closed back, open front and intermediate diaphragm all stitched together at the edges and bottom so as to form a double compartment with a suitable cut away portion at the top to allow the ticket to be easily removed.

WIRE TIGHTENER.—Wm. B. Fielding, San Jose, Cal. No. 513,906. Dated Jan. 30, 1894. This invention relates to a device for stretching telegraph, electric and other wires which are stretched between supporting poles at a considerable distance apart. It consists of heads having projecting forks or yokes between which are journaled poles and a strap which is secured at one end of one of the forks passing around the poles so as to give the proper amount of power to draw the heads toward each other. Either one or both of these heads are provided with a peculiar clamping device which is adapted to grip the wire, so that two opposite ends of wire may be drawn toward each other to any degree of tension, and held until the ends are properly joined. Or if the wire is to be drawn in one direction, the opposite end of the device is provided with a means for securing it to the post or pole toward which the wire is being drawn. A peculiar locking device and pin are used for holding the strap when the wires have been drawn to the proper degree of tension.

MECHANICAL MOTOR.—P. Frichette, Sheridan, Cal. No. 514,356. Dated Feb. 6, 1894. This invention relates to a class of intermediate devices which is designed to increase the efficiency of a pump by increasing the number of strokes with relation to the movement of the initial driving mechanism. It consists of a segment and an operating lever arm, the segment engaging the pinion of smaller diameter so that the movement of the segment will cause as many revolutions of the pinion as desired. The pump is connected with a crank shaft at the opposite end of the pinion shaft, and is thus easily operated.

EXTENSION STEP-LADDER.—Edwin W. Hammon, Davisville, Cal. No. 514,223. Dated Feb. 6, 1894. The object of this invention is to provide a step-ladder which is easily arranged to be used in that manner by means of connecting bars, and has also a means for uniting the two parts at the top. If the ladder is to be extended in the form of a single continuous ladder the top is disconnected, the sides of the bracing ladder are brought into line with the lower step-ladder portion and are held in position by clamps which slide upon the side bars of the step-ladder, these side bars being turned up so as to lie alongside of the two parts when the ladder is extended and the two parts are thus clamped together at the joint so as to be sufficiently rigid to be used as a common street ladder. The device is easily interchangeable and is very convenient for orchard, farm and other work.

HOLDER FOR TOILET ARTICLES.—Wm. M. English and Frederick E. Gladwin, San Francisco, Cal. No. 514,182. Dated Feb. 6, 1894. This device consists of three wire frames so hinged and connected together that they may form a triangular standard upon which a mirror may be supported, having brackets at the rear for supporting a roll of paper, and these frames may be turned into various positions with relation to each other, so as to either rest upon a table hung upon the wall, with one side or the other outward, as may be desired. The frames are also provided with brackets for supporting brush, comb and other toilet articles, also pens, pencils, and desk and office furniture. And when used as a table standard it may support a calendar or any memorandum pad, if desired.

MERRY-GO-ROUND.—Jacob Thompson, Benicia, Cal. Assignor of one-half to T. D. Montgomery of Benicia, Cal. No. 514,393. Dated Feb. 6, 1894. The object of this invention is to provide a rotary travelling frame supported upon wheels and movable about a central pivot posts having seats or saddles so arranged that by means of crank axles the rider can exercise his own power for propulsion of the machine. The machine is so arranged that by shifting the bearing wheel to or from the center a greater or less speed may be attained. It is especially designed to be set up economically, for the amusement of children at home.

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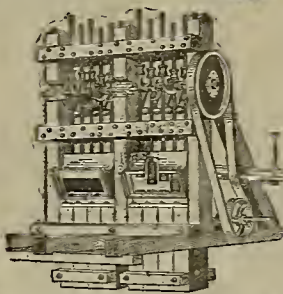
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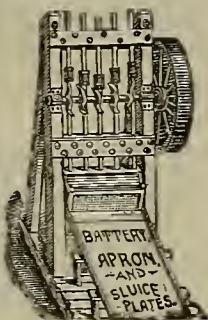
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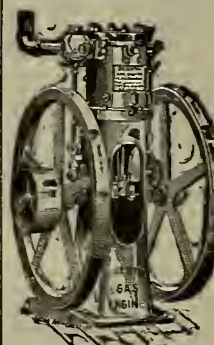
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Market Reports.

The Markets.

SAN FRANCISCO, Feb. 15, 1894.

The silver market during the week has been in a very unsatisfactory condition. Prices are slowly approaching the lowest figure ever reached in New York; and in London they have already passed the lowest previous figure. The explanation, of course, lies in the abundant supply and the restricted market for silver. The output in the Mexican and South American fields is as large as ever; and Australia shows apparently very little falling off in production.

The Coinage for January.

The several Mints of the United States coined during the month of January all the styles of coin known to the American system except four. The aggregate coinage for the month and for the current fiscal year are as follows:

	For January	July 1 to Jan. 31.
Double Eagles.....	\$ 6,655,600	\$23,555,160
Eagles.....	4,466,000	19,866,330
Half Eagles.....	8,360,765	37,513,322
Quarter Eagles.....	319,000	1,735,163
Standard Dollars.....	62,000	289,173
Half Dollars.....	75,200	387,147
Five Cents.....	49,600	249,869
Cents.....		

Totals.....\$11,637,400 \$55,490,288
Same time in 1892-93.....4,531,900 \$25,224,918

Quicksilver Trade.

The receipts of quicksilver at this port for January were 327 flasks, against 2243 flasks for the same month last year and 1704 flasks in 1892. The exports from this port by water in January were as follows:

	Flasks.	Value.
New York.....	1,000	\$ 30,000
Mexico.....	200	6,000
Central America.....	100	3,050
British Columbia.....	31	992

Total.....1,331 \$ 40,042
In 1892.....3,208 133,260
In January, 1893, the shipments to New York were 2600 flasks, valued at \$107,900.

NEW YORK, Feb. 15.—Following are the closing prices for the week:

	Silver in London, N. Y.	Copper.	Lead.	Tin.
Thursday.....	29 3/4	63 1/2	9 7/8	3 25
Friday.....	29 3/4	63 1/2	9 7/8	3 25
Saturday.....	29 3/4	63 1/2	9 7/8	3 25
Monday.....	30 1/4	65	9 7/8	3 20
Tuesday.....	29 3/4	64 1/2	9 6 1/2	3 20
Wednesday.....	29 3/4	63 1/2	9 6 1/2	3 20

San Francisco Metal and Coal Market.

ANTIMONY.		QUICKSILVER.	
Per lb.....	13	Home trade, pr. flask.....	30 00
Refined, in car lots.....	7 1/2	STEEL.....	
Powdered, do.....	7 1/2	Engliah, do.....	20
Concentrated, do.....	7 1/2	Canton tool.....	8 1/2
All grades, jobbing at advance.....	7 1/2	8 1/2 Diam'd tool.....	10
COFFEE.		IRON.	
Bolt.....	23 1/2	Spot.....	21 1/2
Sheathing.....	23 1/2	Do, whole sale.....	22
Am. jobbing.....	20		
Do, whole sale.....	15 1/2		
IRON.		COAL.	
Bar, base.....	21	Spot from yard—per ton.....	8 00
Norway, base.....	21	Wellington.....	8 00
Pio iron.....		Gila.....	7 50
Eglington ton.....	22 50	Nailman.....	6 00
Oleaginous.....	22 50	Seattle.....	6 50
Langdon.....	22 50	Scott Bay.....	5 50
Shots No. 1.....	22 50	Canal.....	5 50
Puget Sound.....	22 50	Egg, hard.....	12 00
Olay Lane White.....	22 50	Wallend.....	7 25
Langdon.....	22 50	Scott Splint.....	8 00
Canal.....	22 50	Brymbo.....	5 50
Barrow.....	22 50	West Hartley.....	7 50
Carbolite.....	22 50		
LEAD.		TO LOAD—PER TON.	
Fig.....	41	Australian.....	6 50
Bar.....	41	Liverpool Steam.....	6 50
Sheet.....	41	Scott Splint.....	7 00
Pipe.....	41	Cardiff.....	7 00
		Lehigh Lump.....	10 00
		Cumberland.....	8 00
		Esch hard.....	9 00
		West Hartley.....	7 50
		COKE.....	
Drop, sizes smaller than B, 8 bag of 25 lbs.....	\$1 75	English, to load, 35 50 to 100 lb, in bulk.....	—012 00
B, 8 bag of 25 lbs.....	2 00	Do, in sacks.....	—014 00
Buck, 8 bag of 25 lbs.....	2 00	Do, in sacks.....	—014 00
B, 8 bag of 25 lbs.....	2 00	Gumbelnd.....	9 00

Mining Share Market.

SAN FRANCISCO, Feb. 15, 1894.

Trade in Comstock shares during the past few days has shown considerable activity. Yesterday Consolidated California rose to \$4.10 and Ophir to \$2.90. Potosi sold at as high as \$1.15. This morning there was still greater activity in the Comstock shares, and prices were higher along the line. Toward noon the sharp advance in some of the stocks drew out sales from people who wished to take their profits, and the market receded sharply. The market, however, had a good tone.

The north-end stocks continued to be the favorites with buyers, but there is the same steady absorption of the leading middle and Gold Hill stocks that has been in progress for several days past. The attendance in both Boardrooms is the largest for quite a time past.

The preparatory or "dead work," such as repairing drifts and making air connections, in the Consolidated California and Virginia, Ophir, Mexican, Potosi, Belcher, Crown Point and other leading Comstock mines will soon be finished, and the operations may be of a more vigorous character. A very energetic search, it is said, will be made for ore, and out of so many interesting exploitations operators are of the opinion that some good will come.

—Placer county is to have an \$80,000 court house.

Coast Industrial Notes.

—San Jose is providing support to its unemployed by placing them at work on the streets.

—There are in Arizona 12,000,000 acres of surveyed land and 34,000,000 acres of unsurveyed land still open to settlement.

—A Salinas authority predicts that the Monterey & Fresno railroad will be built in four months if the right of way is secured before the close of this month.

—The City Council has condemned the Phoenix Opera House as unsafe, and ordered its removal. The building, a three-story brick, was erected in 1888 at a cost of \$25,000.

—While workmen at a limekiln near Gila City, A. T., were prospecting for limestone recently, they found a vein of fine marble, 40 feet wide and equal to the best that Vermont produces.

—The schooner Corona, Captain McAllen, is ashore in Useless bay, thirty miles north of Seattle. She is loaded with lumber for San Pedro and, it is believed, will go to pieces.

—The Humboldt Electric Light & Power Company of Eureka denies a story that the electric light companies are about to consolidate in order to raise the prices of their lights.

—There is a prevailing idea in local shipping circles that marine business is on the mend. Passenger travel on the coast is certainly improving, but that is a result of the Midwinter Fair and the excursion rates offered by the steamship people. Every steamer to arrive, both north and south, is taxed to an extent unknown before in years, and the excess is largely traveling on special round-trip fair tickets. Even the San Blas, from remote ports between Mexico and Panama, came in one morning last week with nearly a hundred passengers—a larger number than any Pacific Mail boat on the southern route has carried for a long time.

—An exhibit of timber from Puget Sound for the Midwinter Fair has arrived from Tacoma on the ship Dashing Wave. There are two of the sticks, which were discharged recently, at Berry street. The largest is a clean stick of Washington pine 117 feet long and 24x24 inches square, and the other is 20x20 inches thick and 105 feet long. Both of the immense timbers are from Harrison's mill at Tacoma, which sent similar exhibits to the World's Fair. The timber which is 117 feet long contains 5,616 feet, board measure, and weighs ten tons. It is the largest piece of timber ever sent here and has not a single knot in it. It will be one of the most interesting single exhibits at the fair.

—The stockholders of the Market-street Railway Company held their annual meeting Tuesday and transacted much important business. It was voted, in order to meet the requirements of the new system, to issue \$17,500,000 in bonds, to be secured by a consolidated mortgage, covering all of the various properties of the company. With this amount the outstanding bonds—amounting to \$7,000,000—will be redeemed either at maturity or before, and the remainder will be used from time to time as the necessity may arise for the construction and equipment of new lines and the improvement of the present system. The bonds will bear five per cent (the old ones bore six), and will run 49 years.

—According to General Casey, Chief of Engineers, there is still available \$25,000 for the operation of the snag boat between Sacramento and Red Bluff. The snag boat will be ordered between Red Bluff and Redding to make that portion of the river navigable. The California Commission will endeavor to incorporate a clause in the River and Harbor bill to have engineers make a survey of Napa river, between North and South Vallejo. If the commission can induce the River and Harbor Committee to grant an appropriation of \$50,000 for a snag boat between Red Bluff and Sacramento, with the \$25,000 already available, they say the river could be put in excellent condition.

—Recently the Mayor and Common Council requested the San Jose Light and Power Company and the Electric Improvement Company to furnish a statement of the financial affairs of each company for the purpose of regulating the rate to be charged by the companies. It is claimed that the rates for light have been so high for five or six years that, as a result, the city is now paying about \$2000 per year more for its street lights than the lowest bid was for. The companies are equally determined to resist this move, for in a communication just filed by the Light and Power Company, a few figures designed to show that the company's investment is only fairly profitable were presented under protest, while the Electric Im-

MINING SHAREHOLDERS' DIRECTORY.

COMPILED EVERY THURSDAY FROM ADVERTISEMENTS IN THE MINING AND SCIENTIFIC PRESS AND OTHER S. F. JOURNALS

ASSESSMENTS.		MEETINGS.	
COMPANY AND LOCATION.	No. AMT. LEVIED, DOLLARS AND CENTS.	MEETING.	SECRETARY AND OFFICE IN S. F.
Alpha Cons. M. & M. Co., Nev.....	12.....100	Jan 18, Feb 21, Mar 20	Chas. E. Elliott, Nevada Block
Alta S. M. Co., Nevada.....	45.....100	Jan 25, Feb 28, March 21	J. E. Jacobus, Nevada Block
Bullion M. Co., Nevada.....	15.....100	Jan 25, Feb 28, March 21	R. T. Grayson, 331 Pine
Condon M. Co., Cal.....	15.....100	Jan 11, Feb 15, Mar 7	Thos. Lynch, 25 Montgomery
Confidence S. M. Co., Nevada.....	24.....250	Dec 27, Jan 30, Feb 20	O. H. Mason, 324 Montgomery
Dora S. M. Co., Cal.....	2.....500	Dec 27, Jan 27, Feb 27, Julius Blumenthal, 415 Montgomery	Geo. E. Spinsky, 310 Pine
East Sierra Nevada M. Co., Nevada.....	3.....500	Jan 25, Feb 26, Mar 15	Chas. T. Bridge, 224 California
El Lindero S. & S. M. Co., Mex.....	5.....100	Jan 25, Mar 1, Mar 19	R. J. Scoville, 20 Sansome
Evening Star M. Co., Cal.....	12.....100	Jan 11, Feb 23, Mar 16	A. K. Durbrow, New Block
Gold & Curry S. M. Co., Nev.....	13.....100	Jan 31, Mar 5, Mar 26	Robert McF. Doble, Mills Building
Govern M. Co., Cal.....	13.....100	Dec 29, Feb 1, Feb 23	Chas. O. Harvey, Nevada Block
Gray Eagle M. Co., Cal.....	35.....100	Jan 10, Feb 19, Mar 12	E. Kelly, Nevada Block
Iowa M. Co., Nev.....	19.....50	Jan 24, Feb 28, Mar 19	K. L. Ross, Sup. Court Bldg.
Justice M. Co., Nevada.....	16.....100	Feb 6, Mar 12, April 2	A. K. Durbrow, Nevada Block
Marlin White M. Co., Nev.....	15.....100	Jan 12, Feb 19, Mar 12	R. E. Grayson, 331 Pine
Occidental Cons. M. Co., Nev.....	15.....100	Jan 12, Feb 19, Mar 12	A. K. Durbrow, Nevada Block
Osburn Hill M. Co., Cal.....	1.....250	Jan 17, Feb 23, Mar 12	R. E. Grayson, 331 Pine
Pearl M. Co., Ariz.....	16.....50	Jan 25, Mar 5, Mar 26	Aug. Waterman, New Block
Reed M. Co., Ariz.....	21.....50	Jan 25, Mar 5, Mar 26	Aug. Waterman, New Block
Santa Fe M. Co., Nev.....	3.....500	Jan 15, Feb 24, Mar 15	Chas. A. Hare, Pier 5, Steamer St.
Sentinel G. M. Co., Cal.....	8.....250	Jan 25, Mar 7, Mar 27	Chas. T. Bridge, 224 California
Seg Belcher & Miden Cons. M. Co., Nevada.....	13.....100	Jan 5, March 9, March 29	E. B. Holmes, Nevada Block
Sierra Nev. S. M. Co., Nev.....	105.....250	Jan 17, Feb 20, Mar 12	E. L. Parker, New Block

provement Company hegs leave for two weeks longer to think over the matter.

—The engineering and machinery firm of Rix & Birrell is before the courts with a petition to be declared insolvent. One member of the firm desires the declaration and the other protests against it. The representation to the court is that the liabilities are \$18,752, the assets \$11,010. The principal creditors and the amounts due them are as follows: P. H. & F. M. Roofs & Co. of Indiana, \$2,843; Bradford Mill Company of Ohio, \$1,466; Brownell & Co. of Ohio, \$2,721; Prentice Brothers of Massachusetts, \$1,017; McIntosh & Seymour of New York, \$1,443; Hoover, Owens & Rentschler of Ohio, \$1,449. The firm also owes \$1,290 to the Donohue estate for the rent of the premises at 48, 40, 42 and 44 Fremont street. The request to be declared insolvent was filed Tuesday by Mr. Birrell. Mr. Rix's name did not appear on the petition.

—The Los Angeles Herald learns that Mr. Huntington has decided to go ahead with the work of making Santa Monica a thoroughly protected harbor, whether the Government assists him or not. To this end he has had plans prepared for a breakwater, to be built of rock, extending for half a mile outside the big wharf at that point. These plans were completed a few weeks ago, and outline a fine piece of protective engineering against the power of the sea. An idea of the completeness of the work and its extent can be had from the estimates which accompany the specifications, and which call for an expenditure of \$1,500,000. It was for the execution of this project that the branch line to Chatsworth Park in the San Fernando valley was recently built. At that place is a quarry of stone peculiarly adapted to resist the action of the water, and from here will be carried the huge blocks to be used in constructing the breakwater. As this will extend out for half a mile, a large portion of the big wall will have to be built up for 40 or 50 feet under water.

Board Sales of Mining Stocks.

S. F. Stock Board.

THURSDAY, February 15, 1894.

9:30 A. M. SESSION.

350 Alpha.....	50 200 H. & N.....	75c
400 Alta.....	100 300 Nevada.....	80c
500 Andes.....	600 250 Juliet.....	10c
600 Belcher.....	100 100 Santa.....	10c
600 Bullion.....	100 300 Kentuck.....	10c
650 Best & Belcher.....	25 500 Mexican.....	17c
600 Bullion.....	25 450 Occidental.....	15c
100 Challenge.....	150 150 Ophir.....	2.80
200 Challange.....	50 100 Overland.....	25c
300 Chollur.....	70 100 Potosi.....	20c
200 C Imperial.....	650 1300 Potosi.....	1.00
300 Cons. Cal. & Va.....	50 800 Savage.....	80c
200 C. Cal. & Va.....	420 500 Silver Hill.....	1.15
800 Crown Point.....	700 200 Silver Hill.....	.50
500 G. & C.....	900 600 Yellow Jacket.....	1.10
50 G.....	650 750 Yellow Jacket.....	.80c

2 P. M. SESSION.

150 Andes.....	60 200 Mexican.....	1.25
300 Belcher.....	110 350 Nevada.....	1.50
350 B. & B.....	240 300 Potosi.....	1.00
200.....	235 125.....	.950
100 Bullion.....	25 150 Ophir.....	2.75
500 C. Cal. & Va.....	410 100.....	2.65
210.....	700 600 Savage.....	.80c
350 Crown Point.....	900 300 Seg Belcher.....	10c
900 G. & C.....	100 300 Silver Hill.....	1.05
350 Kentuck.....	100 300 Union.....	1.05
200.....	150.....	

STOCKHOLDERS' MEETING.

Office of the Superior Mill & Mining Co.

NOTICE is hereby given that a meeting of the Stockholders of the Superior Mill & Mining Company will be held at the office of the Company, No. 323 Front St., Room 2, on Saturday, the 3rd day of March, 1894, at the hour of 2 o'clock P. M., for the purpose of electing a Board of Directors to serve until the next annual meeting, and until their successors are elected, and for the transaction of such other business as may come before the meeting.

The Annual Meeting not having taken place at the time appointed, and no call therefor having been made, the meeting is called and notice thereof given to the Stockholders by the President of said Corporation.

D. L. MUNSUNG, President.
Office, Room 2, 323 Front St., San Francisco, Cal.

Cal. Debris Commission Notices.

THE CALIFORNIA DEBRIS COMMISSION having received petitions to mine by the hydraulic process Daniel W. Albert in the Union mine, near Brownsville, Yuba Co., to deposit tailings behind dam in dry ravine; James Gusten Gump in the Campo mine, near Brownsville, Yuba Co., to deposit tailings behind dam in a ravine; from J. M. Wetmore in the Herring Ravine mine, near Brownsville, Yuba Co., to deposit tailings behind a dam in the Letson ravine; from James Gordon in the Motor mine, near Brownsville, Yuba Co., to deposit tailings in old hydraulic pits; from Crane Bros. in the old Sharon Valley, near Brownsville, Yuba Co., to deposit tailings in old hydraulic pits; from the Spring Gulch Mining Co. in the Spring Gulch mine, near Andrus, Calaveras Co., to deposit tailings behind dam in Chilly gulch; from Joseph Snow and in Snow Bros' mine, near Nevada, El Dorado Co., to deposit tailings behind a dam in Weber creek; and from H. P. Havens in the Green Meadow mine, near Glenn, Calaveras Co., to deposit tailings behind dam in dry ravine, give notice that a meeting will be held at Room No. 92, Flood Building, San Francisco, Cal., March 6th, 1894, at 1:30 P. M.

Assessment Notices.

GOULD & CURRY SILVER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Virginia, Storey County, Nevada.

Notice is hereby given that at a meeting of the Board of Directors held on the 31st day of January, 1894, an assessment (No. 73) of Fifty (50) Cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the Secretary at the office of the Company, Room 69, Nevada Block, No. 309 Montgomery Street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 31st day of March, 1894, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on THURSDAY, the 23rd day of March, 1894, to pay the delinquent assessment, together with the costs of advertising and expenses of sale. By order of the Board of Directors.

ALFRED K. DUKBROW, Secretary.
Office—Room 69, Nevada Block, No. 309 Montgomery Street, San Francisco, California.

OCCIDENTAL CONSOLIDATED MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Virginia, Storey County, Nevada.

Notice is hereby given that at a meeting of the Board of Directors held on the 15th day of January, 1894, an assessment (No. 15) of Ten Cents (10c) per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary at the office of the company, Room 69, Nevada Block, 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 15th day of February, 1894, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the 14th day of March, 1894, to pay the delinquent assessment, together with the cost of advertising and expenses of sale. By order of the Board of Directors.

ALFRED K. DUKBROW, Secretary.
Office—Room 69 Nevada Block, No. 309 Montgomery street, San Francisco, California.

DELINQUENT SALE NOTICE.

STANDARD GOLD AND SILVER MINING CGM Sany. Location of principal place of business, San Francisco, California. Location of works, Butte County, California.

Notice—There are delinquent upon the following described stock, on account of Assessment (No. 1) levied on the 18th day of December, 1893, the several amounts set opposite the names of the respective shareholders, as follows:

Names.	No.	Shares.	Am't.
E. McGrath.....	32	500	\$85 00
E. McGrath.....	34	500	25 00
E. McGrath.....	35	500	25 00
Sylvester Gardner, Trustee.....	40	1,000	50 00
Sylvester Gardner, Trustee.....	62	200	10 00
Sylvester Gardner, Trustee.....	63	1,000	50 00
Sylvester Gardner, Trustee.....	68	1,000	50 00
Sylvester Gardner, Trustee.....	69	500	25 00
Sylvester Gardner, Trustee.....	69	3,750	187 50
Sylvester Gardner, Trustee.....	74	2,000	100 00
Sylvester Gardner, Trustee.....	75	2,000	100 00
Sylvester Gardner, Trustee.....	78	16,675	833 75
Sylvester Gardner, Trustee.....	82	1,000	50 00
Sylvester Gardner, Trustee.....	100	9,490	474 50
Sylvester Gardner, Trustee.....	101	10,000	500 00
Sylvester Gardner, Trustee.....	103	10,000	500 00
Sylvester Gardner, Trustee.....	104	2,065	103 25

And in accordance with law, and an order of the Board of Directors, made on the 18th day of December, 1893, so many shares of each parcel of such stock as may be necessary, will be sold at public auction, at the office of the Company, 330 Pine St., Room 4, San Francisco, Cal., on SATURDAY, the 17th day of February, 1894, at the hour of 1 o'clock P. M. of said day, to pay said delinquent Assessment thereon, together with costs of advertising and expenses of sale.

T. E. JEWELL, Secretary.
Office, 330 Pine Street, Room 4, San Francisco, Cal.

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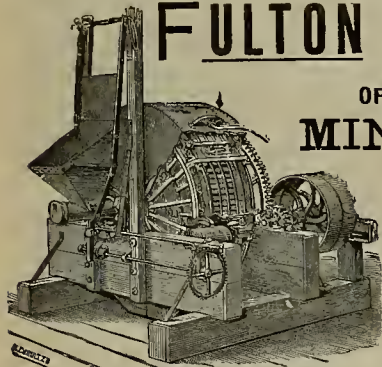
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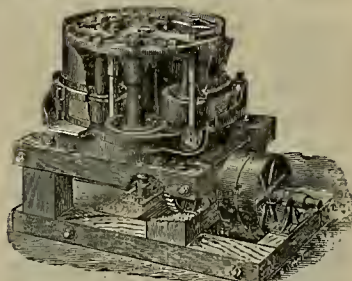
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MINING AND SCIENTIFIC PRESS.

An Illustrated Journal of Mining, Mechanics and Popular Science.

VOLUME LXVIII.
Number 8.

SAN FRANCISCO, SATURDAY, FEBRUARY 24, 1894.

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SINGLE COPIES, 10 CENTS.

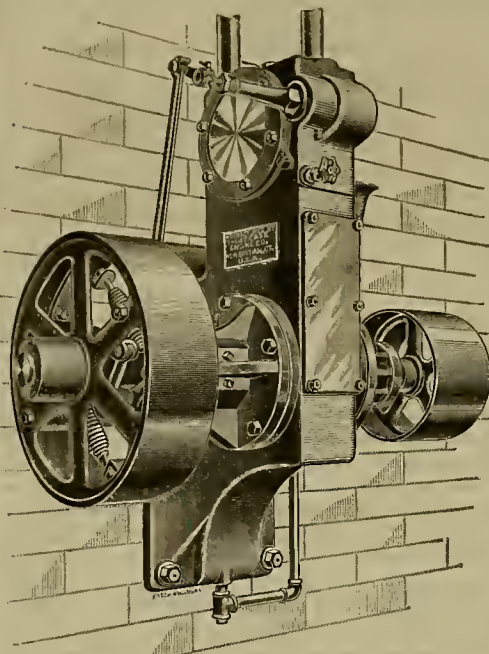
The Case Engines.

New varieties of the Case automatic high-speed engine for small powers have been received here by the Parke & Lacy Co., the agents, and are deemed worthy of illustration.

The Case Company manufactures three main varieties, all embodying the same principles, viz., the pedestal engine, which may be bolted to a substantial floor or to a foundation; the bracket engine, to be fastened directly on the wall where floor space is difficult to obtain; and the hanger engine, to be bolted to an overhead beam; also sundry varieties for special kinds of work, such as driving fans and exhausters, hoisting elevators, etc.

The transparent cut shows that the piston is connected directly to the crank-pin without the intervention of a connecting rod. The piston connected thus at one end to the crank-pin direct travels back and forth at its other extremity through the bore of the cylinder. The latter, by reason of its shape, is free to turn in its casing and is therefore rocked by the vibrating piston rod through an arc sufficient to open and close steam and exhaust ports on its face. The perfect steam balancing of the cylinder permits this rocking motion without friction. A long sleeve screwed into and forming an integral part of the cylinder, and through which the piston rod works, imparts the rocking motion to the cylinder.

The upper end of the cylinder is open, so that steam ad-

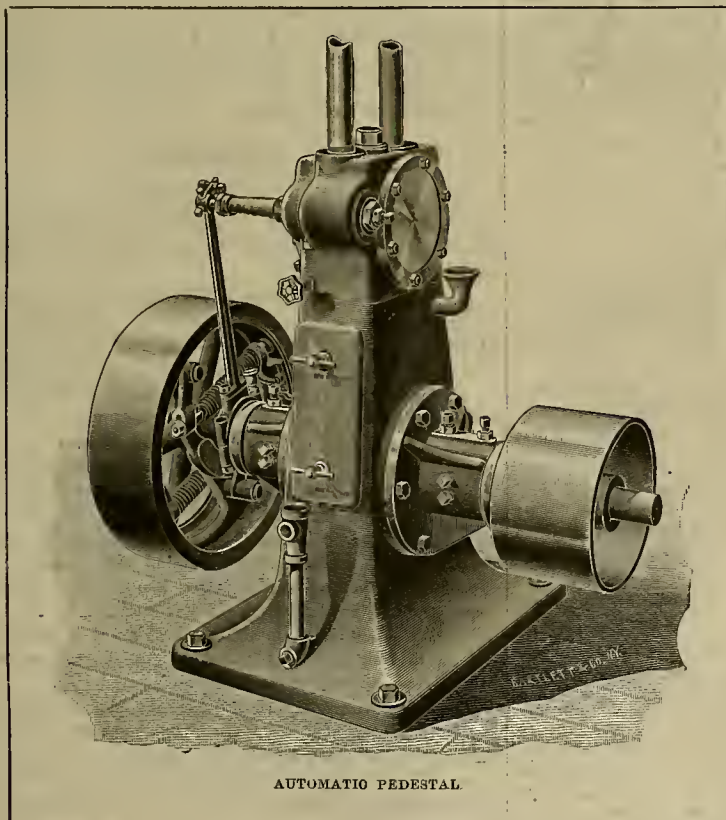


AUTOMATIC BRACKET.

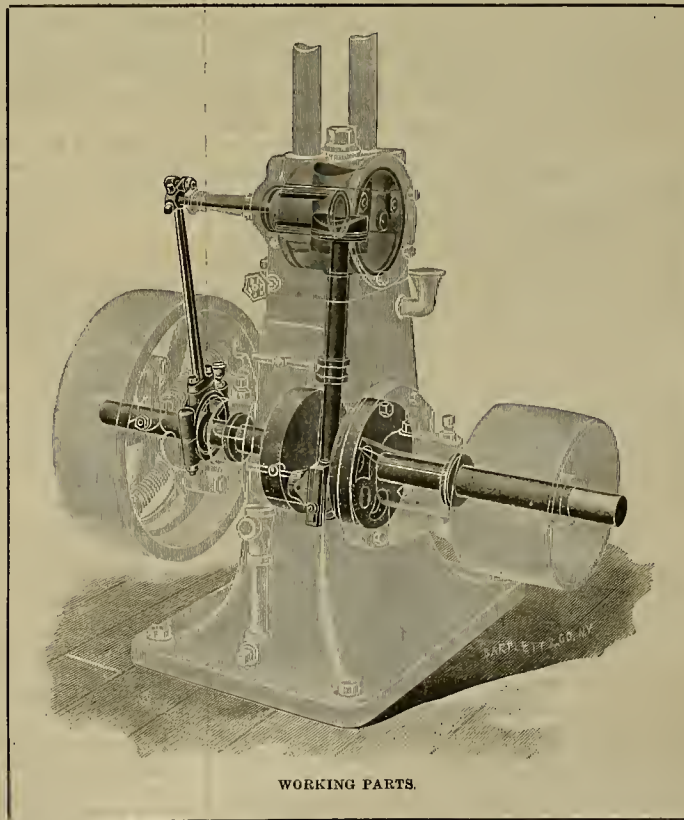
As to regulation, the governor differs from the common type of shaft cut-off governors, inasmuch as it does not diminish the throw of the valve and so throttle the steam on light loads, but has always the same amount of travel, the regulation being effected by its rotating the eccentric on the shaft, and thus giving the valve the right amount of lead over the crank.

The cut-off valve is of the plug type, made with a slight taper so that it can always be kept tight. Its only duty is to define the point of cut-off, the admission, release and exhaust closure being controlled by the rocking of the cylinder which forms a valve action.

The lower half of the case forms a reservoir for oil and water, into which the crank-pin dips at each revolution. The lubricant is conveyed to the bearings at every stroke automatically by pockets in the crank-discs. After the oil has done its work on the bearings, it returns to the case again by gravitation. Any excess, which would naturally work out on the shaft, is thrown off by centrifugal action, from ring wipers, and returned by a separate passage to the case; thus the same lubricant is used over and over again. The oil and water finds its way through small openings to a settling chamber below the reservoir; and, being away from the churning action of the crank, the oil separates from the water and returns to the upper case. A stand-pipe is connected with the bottom of the settling chamber, and consequently the overflow itself is always water. The cylinder is lubricated by an efficient sight



AUTOMATIC PEDESTAL.



WORKING PARTS.

THE CASE AUTOMATIC HIGH SPEED ENGINE FOR SMALL POWERS.

mitted for the downward stroke sets from the head of the piston to the face of the surrounding casing or steam chest, and there is consequently no steam thrust that would tend to cause friction of the cylinder against the casing.

The lower end of the cylinder is closed, but the same

thing is accomplished for the upward stroke by the admission (through passages leading from the ports) of a thin film or layer of steam to a small balancing chamber, of equal area with the piston, hollowed out in the bottom of the cylinder. By this method no power is required to rock the cylinder, it being steam-balanced and frictionless.

feed oiler, furnished with each engine, to be connected to the steam pipe.

The bracket and hanger engines are novel varieties and make possible the use of an engine (directly coupled or belted to its work) in locations where no other engine could be placed, and in many cases save valuable floor space.

MINING AND SCIENTIFIC PRESS.

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Our latest forms go to press on Thursday evening.

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San Francisco, February 24, 1894.

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In view of the tremendous depreciation in silver and lead values the semi-annual report of the Broken Hill Proprietary Company, New South Wales, is full of interest. The six months' production was over 6,500,000 ounces of silver, making the total for one year ending Nov. 30, 1893, 12,500,000 ounces. The Australian record was thus broken. To be exact, the output has increased during the half year from 5,894,962 ounces silver and 21,690 tons lead, to 6,533,232 ounces silver and 25,822 tons of lead. The ore treated rose from 208,042 tons to 246,520 tons, but the average output shrank from 28.34 ounces of silver per ton to 26.5 ounces per ton, though the yield of lead is almost unaltered. If to the above output is added the tailings, etc., treated, it brings the total of ore dealt with to 260,047 tons. The cost of winning the silver and lead from the ore was £2 13s 10d per ton, and as the value of the ore was £4 8s 9d per ton, there has been a net profit of £1 14s 11d per ton. Here, again, there has been a shrinkage in the worth of the ore from £4 16s to £4 8s 9d, but this is largely due to the utilization of the lower grade materials and the conservation of the carbonates. It would be interesting to know the value on which the calculation as to value is based. The result of all these operations has been that during the half year the shareholders have received £283,000 in dividends and £30,000 in bonuses; £30,065 have been allowed for depreciation, and £40,024 have gone into construction account. The total expenses during the half year have absorbed £700,061 out of the total of mine earnings of £1,154,294. Out of the net profits of £453,633, the directors have not only paid dividends, etc., but have put £30,000 to the credit of the reserve fund, which now stands at the respectable total of £110,000.

THE controversy between Mr. Chapman and Mr. McLeod is really no controversy at all. Each gentleman practically agrees with all the other says, though perhaps not with the manner of statement. Mr. Chapman advocates deep mining, but it does not follow that he is not favorable to surface mining. Mr. McLeod advocates surface mining, but he is by no means opposed to deep mining. Mr. Chapman's position is substantially that the absence of pay ore near the grass roots, if other indications are favorable, is no indication that the mines will not pay at a reasonable depth. Mr. McLeod's position is that surface mines have contributed the greater part of the wealth of the country, and will continue to do so. Mr. Chapman thinks a mill should not be erected until the mine is more than a hole in the ground. Mr. McLeod agrees with him; but he does not think it necessary to wait until the sinking has reached the 1000 level before erecting a mill. He is right.

THE Moser mine has been shut down in Calaveras Co. owing to differences between the lessees and owner, S. S. Moser. It is hoped, however, that arrangements now pending will be made to reopen the mine in a few weeks.

A Harmful Decision.

A press dispatch from Washington, under date of February 17th, contains the following:

The practice of the General Land Office has been materially changed by the Secretary of the Interior in the case of E. O. Farrell et al. against William L. Hoget et al. of the Helena, Mont., land district on appeal from the decision of the Land Commissioner. The Secretary holds that the holder of each 20-acre tract of any placer claim must show discovery of minerals in order to obtain a mineral patent. Whether the claim is surveyed or unsurveyed makes no difference in the rights of the locators. Accordingly, location made on a larger amount of land is void, except for the 20 acres immediately surrounding it. This is a reversal of the action of the Land Office.

If the Secretary of the Interior is correctly reported, he has rendered a decision most seriously menacing the interests of every State and Territory containing auriferous gravels. It is well known that the practice is, or has been, in this State to locate claims to be worked by the hydraulic process, to the extent of 160 acres, the full limit allowed by law. These claims are located by associations, each individual representing 20 acres, or less, the organization being effected that the gravel beds might be systematically and economically worked. It has been heretofore held that the presence of gold in one of the tracts covered the entire location of 160 acres. The entire reasonableness and the necessity of this construction of law are apparent to all who know the meanderings of the old river beds in which the gold occurs and the difficulty of establishing the presence of gold in any particular spot in the gravel by mere prospecting. That is to say, when it is desired to mine gravel on the scale usually practiced in California, the territory must be sufficient; and 160 acres are often little enough. Under this decision only 20 acres at a time can be located, unless the presence of mineral is established in all the subdivisions desired to be embraced in 160 acres. The meanderings of the auriferous channel must therefore be determined in advance. It cannot be done.

The decision is ruinous to the prospective hydraulic mining enterprises; and we assume that it will affect present unpatented holdings in each subdivision of which the presence of mineral has not been established. It is but another instance of the steady trend of decisions against mining interests by the higher officers of the government, and well illustrates the increasing difficulties with which efforts to obtain mineral lands are surrounded. It emphasizes, also, the very great need of a clear, fair and unambiguous code of mining laws, which shall protect the interest of the miner as well as the government and the general public. The bill of the California State Miners' Association, just introduced in the House by Congressman Newlands of Nevada, is a step in the right direction. Among other reforms, it will correct the particular grievance inflicted by the decision of the Secretary. It provides that where a claim is in a well-known mineral belt it shall be presumed to be mineral; and so shall the adjoining territory. It is to be hoped that Congressman Newlands, in his efforts to secure the passage of this highly necessary measure, will have the earnest support of delegations from all the mining States.

The Moffit Process.

THE PRESS recently contained a brief notice of the Moffit process of base ore reduction, the invention of Mr. J. R. Moffit of Stockton. The process has attracted some attention, and additional particulars may be of interest.

The inventor claims to have expended over \$30,000 in his various experiments. He is a Massachusetts man and came to California about 12 years ago. He took his first patent out in 1885, and a patent for an improvement thereon in 1890. Since that time he has applied for two additional patents. He has also many other claims covering the same system. The machinery occupies very little space and is constructed so that it can be easily transported over mountain roads.

The three conspicuous claims of the invention are: First, the application of incandescent heat with cyclone motion; secondly, the separation of the gases under atmospheric pressure; and thirdly, the precipitation of the precious metals, liberated from all refractory elements.

IT IS ANTICIPATED that the State Anti-Debris Association may not in future have the strong backing from the various county governments it has had in the past. At the last meeting of the Sacramento Board of Supervisors Chairman Morrison said: "Now, gentlemen, here is a bill in regard to which I was called before the Grand Jury. It is for our monthly dues to the Anti-Debris Association, \$300. The Colusa Grand Jury recommended that that county double its subscription, but I don't know what our Grand Jury will do. This bill we owe already, the only question being as to the future." Supervisors Ourtiss and Todd expressed some doubt as to the advisability of maintaining this expense, but the members of the Board were

unanimous as to the allowance of claims already accrued. The demand was ordered paid and the subject was not further discussed. It seems to be a fact that the Anti-Debris Association is not giving the river counties value received for the appropriations from the Supervisors. There is now no real controversy between miners and farmers, and the maintenance of the organization is useless.

Miners' Strike at Cripple Creek.

A strike of miners at Cripple Creek, Colo., has resulted in the closing down of all the leading producers in that camp. The trouble arose over the attempted enforcement of the eight-hour law by the Micoers' Union. The mine owners gave notice that they would demand nine instead of eight-hour shifts after February 1st, at the same wages, and the Miners' Union refused to accede to the demand. Posters were sent out by the union warning miners to keep away from Cripple Creek. The mine manager who is accused of having started the move to increase the hours was caught, while accompanied by two armed body guards, the three disarmed and the manager forced to get down on his knees and swear that he would leave the camp and never return. A dozen men have been arrested, charged with being the leaders of this attempt at mob rule.

On February 7th 200 miners met on Bull hill and proceeded to the various mines still working the nine-hour shifts and demanded that they adopt the eight-hour schedule or close up. They succeeded in placing the North Star, Gold Dollar, Prince Albert, Climax, Kismet and Santa Rita on the list of eight-hour mines. The Granite was closed up because the foreman refused to permit the men to work eight hours. Of course the superintendents of the mines agreed to the demands of the men through fear of mob rule, and probably with no expectation of carrying out their agreement indefinitely.

A few days later a meeting of Cripple Creek mine owners was held. Nearly all the large mines were represented. The meeting was a secret one, but it is learned from an authoritative source that the owners decided to adhere to their demand for a nine-hour day at the rate of \$3, and to keep the mines closed until this was accomplished. The owners present represented mines employing over 500 men.

The miners appear so far to have the best of the situation; but it seems likely that they will be worsted in the long run. The number of unemployed miners in Colorado is very large, and they will not be disposed to stand on ceremony in taking the places of the striking miners. Of course there is some fear of violence if they attempt it, but starvation is a more powerful persuader than fear of personal injury.

It is reported that the non-union miners of Colorado are already on their way to Cripple Creek from the various camps of the State. They have been assured that they will be protected in taking the strikers' places. The end of the strike seems not far off.

Boring for Gravel Mines.

Important results are announced to have followed prospecting for gravel ground on the Forest Hill divide; and the utility of boring machines for that purpose has been very satisfactorily proved.

President Chappelle of the Mayflower Drift Mining Company, some months since bought a boring outfit for \$1,400. Five or six holes have been put down to varying depths and some valuable developments have been made. By means of these borings at least two new and heretofore unknown gravel channels have been discovered, one of which is supposed to be a continuation of the famous channel on which is located the Paragon mine at Bath. The other is on the Mayflower, and immediately over the channel which the company is now working. The present works are 614 feet below the surface. In boring through to the present works, at a depth of 452 feet the auger cut through a channel of reddish gravel about eight feet in depth, the existence of which was never suspected. Again, at a depth of 590 feet from the surface, another channel, heretofore unknown, of blue gravel, and about seven feet in thickness, was cut through.

These discoveries the *Placer Herald* considers very important. The gravel from them prospects well and the possibilities of their future development may be very great. Whatever comes of them may be credited to boring, for it is more than likely that except for the institution of the process as an element of mining they never would have been known.

THERE are indications of a very active season of gold mining in Tuolumne county. The great success of the Rawhide has attracted attention, and has done much to advertise the merits of Tuolumne's mines. Several important mining deals are on the tapis, and there is no doubt that some, or all, of them will come to a satisfactory conclusion.

The Necessity of Full Development.

By W. S. Chapman.

I am glad to see that my remarks on gold mining in California have called out the very intelligent and just criticism of Mr. Taylor D. McLeod. He evidently knows whereof he writes, and his views upon the subject of deep mining I fully and unhesitatingly endorse.

Very many rich mines of this State have paid from the surface down to a greater or less depth; and when good pay ore is found in any mine in quantities to justify the erection of mill and hoisting works, no one would object to the proper utilization of the treasure. The less depth of such results the more cheaply it may be worked, of course.

When large, well-defined veins of mineralized ores are found, but of too low grade to justify the erection of expensive works, it surely should not be abandoned and declared worthless short of a thousand feet in depth, or even much more. The Kennedy mine was abandoned at about 600 feet in depth, as have been very many others on the same great lode. The Utica was also abandoned because it was too poor to pay for exploration, and even now while paying more than any other mine in this State, it is yet only 900 feet deep. This instance shows clearly the importance of thorough prospecting to a considerable depth before abandoning a mine as worthless.

Sinking a shaft in poor ore does not by any means prove the mine to be worthless. It is well known that rich ore is found in chutes and not always equally distributed throughout the entire length and width of the vein; hence the imperative necessity of drifting some distance upon the vein in order to satisfy the miner of the real merits or demerits of the mine.

It is entirely possible to sink a shaft to a considerable depth in ore of very little value, while a very valuable pay chute may be within reach of a drill, as very pertinently suggested by Mr. McLeod.

This suggests to my mind the importance, in all the large mines, of the more frequent use of the diamond drill. I am satisfied that in many instances large bodies of good ore have been left undiscovered where a good drill would have developed the hidden treasure at a mere nominal cost of time and money, while to extend a drift for the same purpose would be costly, and in many instances the uncertainty and cost forbid the test.

One notable instance recurs to my mind where this condition existed in a most marked degree. At Tombstone, in its best days, I went very thoroughly through one of the leading mines with Mr. James, then in charge, and he showed me a drift which he had run, as I now remember, over 100 feet, following a small white line, not larger nor unlike a chalk line. The line was only visible when shown to me on the top of the tunnel, but it led to a body of ore from which he extracted more than a million dollars' worth of ore. There was, so far as he could find, no clue to that valuable ore deposit, save alone this apparent chalk line. A diamond drill would have reached that ore body in a few days, at a very small cost. But for the observance of that small line, followed more out of curiosity than anything else, that ore would have been left, possibly, for the next generation.

What California wants is capital to develop her mines, and confidence to engage in that enterprise as a business, and that confidence can only result from intelligent, faithful management.

W. S. CHAPMAN.

Miners' Boarding-House Blown Up.

At 3 o'clock Monday morning a tremendous explosion aroused the whole camp at Angels, Calaveras county. It was thought at the time that some of the powder-houses at the mines had blown up, and that a great quantity of explosive had been ignited. The report was so loud that it was heard at Murphys, six miles away, and so violent that most of the window glass in Angels was shattered.

It was found after an investigation that for the second time recently a house had been blown up by the use of giant powder. The house destroyed this time stood just across the street from the Sticks hoisting works, and it was owned and occupied as a boarding and lodging-house for the miners by an Austrian named Mitchell Magud. The building was known locally as the "Old Dick Hockman House." It was sold to the Austrian about a year ago. It contained some five or six rooms.

At the time of the explosion the miners were all at work on the night shift in the mine, and as far as can be learned the only persons in the house were Magud, his wife and their two-year old child. The giant powder was placed outside on the steps leading down to the basement, and when it exploded the house was literally blown into kindling wood. By what must be considered as almost a miracle the lives of the three persons in the building were

saved. When the walls of the house went out the roof fell and imprisoned Magud and his wife, who were thus protected from the falling timbers. The baby went through a hole in the floor and dropped into a wine tank below, being unharmed by the fall. The doctor who was at once summoned, found that Magud had been bruised about the ribs, and Mrs. Magud scratched on the neck. Otherwise they were not hurt. Pieces of the timber from the house fell a block away, and all the windows in the houses near by were left without glass. It is thought that 20 pounds of powder were used. The police here are working on the case, but can only conclude that the man who blew up this house may be the same who blew up the other something over a year ago. It is surmised that it may be the work of a crazy man, which makes the citizens very apprehensive.

Many Resolutions Passed.

The Trans-Mississippi Congress concluded a very busy and notable session in this city last week, having discussed a great variety of subjects. It passed the hydraulic mining and river improvement resolutions (published in last week's issue) and adopted also the following:

Resolved, That we recommend the opening of the mints to the coinage of silver on the same terms that they are now opened to the coinage of gold, and at the ratio of 16 to 1.

One of the most important resolutions of the session, introduced by Governor Rickards of Montana, was considered on its merits and received unanimous approval. It is as follows:

Resolved, That Congress is hereby memorialized to take such action as will insure to the people the mineral lands lying within the limits of the land grants heretofore made to railroads, and so legislate upon the subject that no mineral lands shall pass under said grants.

Resolutions recommended by the committee were read by the secretary as follows and adopted with but few dissenting voices: Requesting the erection of defensive works for the protection of the Pacific coast and Puget Sound; asking that all mountain forest lands be saved from mountain fires and the same be preserved for their bearing upon the irrigation problem; that an experiment station be established in the center of the arid belt country; providing for the admission into the Union of New Mexico, Utah and Arizona; suggesting that Senators and Representatives be asked to present the resolutions of the congress, and that they act in concert; that a national bankruptcy law be enacted; condemning the policy of forcing upon Hawaii a restoration of the monarchy as abhorrent to justice and to the principles of the American people, prohibiting the dominance over the islands of any foreign power, and favoring the peaceful annexation of the islands as the true solution of the Hawaiian problem; urging the laying of a submarine cable to the Hawaiian Islands; recommending the creation of a Secretary of Mines and Mining as a member of the President's Cabinet; demanding the immediate opening to settlers of all Indian lands ready for settlement; recommending the establishment of a postal telegraph and postal savings banks; demanding the foreclosure of the Central Pacific mortgage when the same shall become due; urging the improvement of Coos Bay harbor and the fortification of San Diego harbor; urging the improvement of the Willamette river so as to render it navigable to Eugene City; asking Congress to provide for the selection of United States Senators by direct vote of the people instead of by the indirect vote through Legislatures; and endorsing female suffrage.

Slickens.

The Good Hope mine, near Ferris, is to start up at once.

The Bald Butte Mining Company of Montana recently paid a dividend of five per cent, amounting to \$12,500.

The Rico-Aspen Consolidated Mining Company of Colorado has paid a dividend of 2½ cents per share, amounting to \$25,000.

The Standard Consolidated Mining Company of Bodie District has declared a dividend of ten cents per share, aggregating \$10,000, and payable March 15th.

The Homestake Mining Company of South Dakota has declared a dividend of 10 cents per share, amounting to \$12,500 payable February 25th.

The Oroville Mercury advocates the construction of a good road from Oroville to Forbestown, on the ground that the latter has now become a leading mining center.

JOHN K. BALWIN, a young farmer on the Calaveras river, has found a ledge of disintegrated, high-grade quartz on his place near Bear mountain. He will now become a miner.

Plans and specifications have been prepared for a 20-stamp mill on the Dividend mine, Prescott, Ariz., and the company have invited bids for its erection. They expect to have it in operation within 90 days.

A WONDERFULLY rich gold find has been made in the Colorado desert, sixty miles from San Bernardino and twenty miles from Indio. Old miners think this discovery is where the Indians used to find the gold they showed to people in Caliente.

A CENTENARIAN died a few days ago on the Mission road near San Diego. He was a pioneer miner named D. Burchard, and he had reached the great age of 103 years and five months. He was a native of New York and had been in California 43 years.

THURSDAY EVENING a timberman at the Standard mine at Burks, Mont., named John Sullivan lost his footing and fell about 120 feet. Upon examination it was discovered that no serious injuries beyond the fracture of one arm were received by him.

EXCITEMENT prevails in the vicinity of Needles over the new gold fields in the vicinity of Goldstone, about twenty miles west of Fenner. Miners are flocking there from all parts of the country. Assays from five claims show very well. The mountains are well supplied with wood and water.

The Bullion Consolidated Company has filed articles of incorporation. Principal places of business, Forbestown, Butte county. Capital stock, \$70,000, with Charles Bonvier, Bannett

Moyle, George Albert, Frank Willst, Jesse Clement, John Peller and William Smitherton of Forbestown as directors.

A SMALL EXCITEMENT has been stirred up in Oakland by the finding of a gold nugget in a bluff on the east shore of Lake Merritt. It does not indicate a gold mine by any means. Nuggets have been found in that vicinity at rare intervals, but they seemed to have strayed a long distance from home.

It is stated on good authority that T. R. Hofer, Superintendent of the United States Mint at Carson, has received notice from Washington that his resignation would be accepted. Ex-Governor Adams, Milt Elstner, Harry Day, J. C. Haggerman and John Wagner are mentioned as probable successors.

A DEPUTY UNITED STATES MARSHAL from Portland levied an attachment upon the Hammersly mine in Josephine county, Or., to satisfy a judgment in favor of the Government for \$16,000 against the Hammerslys, father and sons, for cutting timber on government lands in eastern Oregon several years ago.

OCEOLA Consolidated Gold Mining Company has filed articles of incorporation. Principal places of business, San Francisco. Capital stock, \$100,000, with Frank D. Monckton and Sheldon P. Monckton of San Francisco, John C. Franks and Carrie A. Franks of Alameda and John L. Ashley of Fresno as directors.

The South Spring Hill mine, Amador county, after shutting down temporarily, is soon to start up. The shaft is being repaired at present and the intention now is to sink a new shaft and prospect the lower levels below the 900-foot, which will undoubtedly prove the mine to be valuable property, and place it again upon the list of dividend-paying propositions.

At the annual meeting of the Standard Consolidated Mining Company the old management was unanimously re-elected. The directors are: Thomas H. Leggett (president and general manager), William Burrows (acting president), J. W. Pew (secretary), W. H. Oscanyan, C. H. Badeau, A. P. Bratton and John Mason. The company has in its treasury the sum of \$41,685.57.

THE COMPANIES owing furnaces at Denver have decided to shut down half of their furnaces. This action was made necessary on account of inability to get ore stocks or carbonates. The recent development of gold properties and the consequent unusual amount of gold ores to be handled largely increased the demand for carbonates. The supply is short by reason of the shutting down of so many lead-silver mines.

A CORRESPONDENT of a Butte paper, writing from Basin, says there is no need of booming that camp, as people are going in there too fast to be accommodated already. The hotels and lodging houses are so crowded every night that there are not rooms enough to go round. The snow is quite deep and there is no work except in the mines now operating. There are no peace officers in the camp and the residents are going to petition the County Commissioners to make some appointments.

THE sulphurets from quartz mines in Siskiyou county, if saved and properly worked, will pay handsomely, says the Yreka Journal. In fact, very few mines yield good returns without gaining the gold in the sulphurets. If they are reduced down to a high grade and shipped below to the Selby works there is no doubt about the certainty of realizing handsomely. Those interested in quartz mines will do well to investigate this matter and save up the sulphurets for shipment in carload lots.

THE gold mines of southern and eastern Oregon are going to be factors of no small moment in the revival and support of business in Oregon. The Oregonian says that they will yield \$2,000,000 this year and probably more. Whatever they produce is so much new money brought into existence for payment of labor and support of trade. More attention will now be paid to Oregon's mines than at any time during the past 25 years. Low value of wheat, wool, lumber and other products are sending much labor back to gold mining.

SHIPMENTS of Mexican dollars to China go by every outgoing steamer. The silver bullion in bars and bricks sent out is unusually considerable. The Peru took for Hongkong banks last week \$142,000 in Mexican dollars, \$151,000 worth of bar silver, \$1395 in gold coin and 4600 Peruvian soles. Silver is the principal circulating medium in China, as it is in Japan, India and other oriental countries. By the Peru there was also shipped \$39,000 in bar silver to Japanese banks in Yokohama and Tokio. The total shipment by the steamer was \$338,059. Nearly every steamer sailing from here to the Orient takes \$200,000 to \$400,000 in specie.

A SUMMARY of the operations of the British Mint during 1893 has just been issued by the authorities. It shows that the total amount issued in gold was £8,915,751, and the sum withdrawn (under the provisions of the Coinage Act, 1891) £6,300,000, as compared with £13,697,540 and £16,200,000 respectively in the previous year. During 1892 light gold coin of the value of £1,163,125 was also received as bullion. The silver issued in 1893 represented £1,008,971, as against £849,932, while the total amount withdrawn was £294,113, compared with £227,216 in 1892. The total sum issued in bronze during the period under review was £46,664; in the previous year it was £58,556. The amount of silver bullion purchased was 2,212,303 ounces (troy), valued at £334,587. The average price in London market was 35½d. per ounce, as against 39 13-16d. in 1892. The total number of coins struck at the Mint during the past twelve months was 78,094,480, as compared with 67,334,847 in the preceding year.

THE smelter of the Puget Sound Reduction Company at Everett, Wash., started its fires last week and will make a test run with the ore on hand, which is sufficient to carry one furnace about two weeks. Base bullion will be turned out there and sent to San Francisco to be refined. Silver predominates over other precious metals in most of the ore now in the bins, though there is considerable gold in some of the rock. There is a large percentage of lead, to be sure, with some copper. The concentrator at Monte Cristo is now practically completed, and only the spouts and chutes for handling ore yet remain to be constructed. The machinery has all been in place for several days, and a satisfactory trial run was made last week. It is the opinion that the Everett smelter will treat concentrates from Monte Cristo early in March.

Mines and Mining in Nevada County.

TO THE EDITOR:—Since my last correspondence to the PRESS two transactions of exceptional importance have been consummated in this district. I refer to the transfer of the Idaho mine to the Maryland Company, and also the purchase by Mr. Hague of the Rocky Bar, Stockbridge, Great Britain, New York Hill and Massachusetts Hill mines. These transactions are full of significance to this city, and indicate an era of great prosperity in the near future. It is very fortunate for this community that the Maryland Company has complete control of the Idaho property, for they can now continue developments without the obstruction or restriction of any outside influence. It is very advantageous to be thus unincumbered, and it is hoped that at no distant date the full complement of men will be employed at the Maryland mine. Mr. Dorsey, the president of the Maryland Company, has announced his determination to push operations with energy and vigor, and the necessary buildings are being constructed with great rapidity.

It is almost impossible to estimate the effect which the reopening of this mine will have on this district. Not only will it give employment to a large number of men who are now idle, putting a large revenue into circulation every month, but it will prove how far the Idaho vein runs into the Maryland property. The fact that all the operations will be conducted in the Maryland mine will prove the extent and richness of that property. The successful operation of the mine will stimulate others to develop properties situated in that locality.

Mr. Hague, purchaser of the mines above referred to, is the president of the famous North Star mine of this city, and through the personal attention paid to this mine by him it has been developed in a highly successful manner. In the mining world he is regarded as a shrewd and careful speculator, and his previous investments in this district substantiate this assertion. The rehabilitation and development of these old abandoned properties will be watched with interest by the mining world. Mr. Hague's connection with them will give them prominence and reputation among mining men; and that he is in a position to place a proper estimate upon their value no one will dispute. The section in which these mines are located was at one time the most productive and prosperous environment of this city, and there is no apparent reason why the circumstance should not be repeated. The mines, without exception have only been developed to a superficial depth, and in the aggregate they have produced millions of dollars. These mines were never abandoned because of any depreciation in their intrinsic value. Rich ore veins are known to exist in this locality, and they have never yet given evidence of diminishing in size or value. The old Rocky Bar mine has produced approximately \$2,000,000, and the New York Hill claims the credit of producing over \$1,200,000.

The future of Grass Valley is bright indeed, and with cheaper and increased motor power we shall in a few years double our present production.

Very few people seem to know that gravel of any value or quantity exists in this city. Yet there is a rich gravel channel which runs through the heart of the city, and which has been traced to You Bet, ten miles to the east. In the early days this channel was worked extensively, and at places it was found to be extremely rich. At one place—under the site where our present high school is situated—a layer of gold was found, three-quarters of an inch in thickness. But on account of the channel being small and the gravel being strongly cemented the process of extraction was tedious and extremely slow. But many thousands of dollars were extracted by many men who are to-day residents of this city. Most of the work on this channel has been done in the vicinity of Alta hill, a mile north of town. In 1870 over a dozen companies were engaged in gravel mining on this hill. The channel was worked successfully and over \$500,000 was produced, and the "lead" was lost and work was abandoned. For the past eight months the Jenny Lind Gravel Company has been operating on this hill. They ran a tunnel east into the hill 500 feet. The roof of the tunnel is 265 feet from the summit of the hill. A short time ago while putting an upraise to the surface for the purpose of ventilating the mine the old "blue lead" was intersected eighteen feet above the roof of the tunnel. This is the "lead" that was lost in the Hope mine a number of years ago. It is dipping east and displays a thickness of four feet. The company, which is composed of workmen, is very jubilant and anticipate important developments in the future. The claim has an area of 120 acres.

Exit Idaho. With the transfer of the Idaho property to the Maryland company the name of "Idaho" will be dropped from the annals of mining and will only be known to us as something that existed in the past. It may not be

inappropriate at this juncture to give the readers of the PRESS a brief history of this famous mine.

The mine is situated about a mile and a half east of the city of Grass Valley. It was discovered in the bed of Wolf creek, in the early days of placer mining, and located May 9, 1863, by a number of citizens, prominent among them being the Coleman brothers, M. P. O'Connor, A. B. Dibble, Peter Johnson, Jules Fricot, F. G. Beatty, S. W. Maslin, William Loutzenheiser, A. B. Brady and Geo. D. McLean. Scant attention was paid to the claim for a number of years, only the necessary assessment work being done to prevent the mine from being "jumped" by outsiders. The quartz taken from the vein during these annual workings was of a very low grade; the vein was small, and no effort was made to develop the mine systematically until the summer of 1865. In the summer of that year work was commenced in the creek, with the intention of following the croppings as far as possible, but in this the owners were disappointed, as the croppings could not be traced more than 175 feet from the western boundary of the company's claim. The quartz seemed to be very poor, showing no gold and carrying but very little sulphurets, but it gave signs of permanency, and the company decided to prospect. A prospecting shaft was commenced, and as depth was attained the ledge began to improve in size and appearance, and the owners determined to erect machinery and develop the property on a large scale. A twelve-inch pumping engine and an eight-inch hoisting engine were erected, and on the 5th day of July, 1865, a vertical shaft was commenced on the south side of the creek, about 290 feet from the western boundary. This shaft was located so as to intersect the ledge at a depth of 150 feet.

At a depth of 120 feet from the surface a ledge was encountered, but as it was small and not bearing any gold or sulphurets, it was rejected as being of no value. About this time the company became financially embarrassed and it was decided to suspend operations. In 1867 a more complete organization was effected by the incorporation of a company under the name of the "Idaho Quartz Mining Company," with a capital stock of \$310,000, divided into 3100 shares, each share representing one foot of the ledge. Work was shortly after commenced by sinking the shaft still deeper. One hundred and forty feet from the surface the fissure was struck, but there was no quartz, there being a few inches of clay formation where the ledge should have been. The shaft was continued to a depth of 300 feet from the surface, without meeting with any success. At this juncture a drift was run west and 108 feet from the shaft the ledge was intersected, showing gold quite freely, the first twenty carloads paying \$29 per load. This marked the beginning of the era of prosperity enjoyed by this company. After a few months of exploration work it was decided to erect a fifteen-stamp mill. The erection of the mill commenced in the summer of 1868, and was completed and put to work in October of the same year.

At the annual meeting held on the second Monday in December, 1868, the superintendent's report stated that the expenditures for the previous 15 months, or since the incorporation of the company, had been \$68,098.63. It may be interesting to note that the money expended by the stockholders for the development of the mine and placing it on a dividend-paying basis was, from the commencement of work in 1865 to the incorporation of the company, the sum of \$19,490.50, and since the incorporation, \$19,053.25, the whole aggregating \$38,543.75. After striking the ledge in the 300-foot level the shaft was continued down, but no quartz was encountered until a depth of 520 feet from the surface was reached. At this point the ledge formed, and the shaft was continued to the 600-foot level, where drifts were run both east and west. Explorations were continued, and each month added to the value and permanency of the property, and it soon became recognized as the leading quartz mine of the State.

In 1871 a new shaft was commenced about 150 feet east of the old one. This shaft was 6x20 feet within timbers and supplied with cages and all the other modern appliances. In 1872 hoisting engines of the most approved character were placed on this shaft, and they continued working without interruption until the great fire of a few weeks ago. The mill was enlarged by the addition of 20 stamps, making 35 in all. The improvements made in that year incurred the expenditure of \$102,222.52, and, in addition to this large outlay, the yield from the mine, with 15 stamps crushing, gave the company a surplus of \$162,750 for the year, after paying all the necessary expenses.

The Idaho is an east and west vein. It has been one of the most valuable in the State, having yielded pay ore for a distance of 1600 feet along the level. Its foot wall is a serpentine rock and its hanging wall a metamorphic. The size of the ledge has varied from one to six feet, giving an

average thickness of from three to four feet. The quartz has paid regularly, as may be inferred from the fact that for a period of 135 months, commencing in 1869 when the first dividend was declared, 127 monthly dividends were paid, leaving only eight months in eleven years without a dividend. The gross output of the mine to May, 1893, was \$11,864,822.14. Paid in dividends to May, 1893, \$5,035,950, making the total number of dividends up to that date 275. Since May 1, 1893, the mine has been under the control of the Maryland Company, and over \$70,000 of the purchase price has been paid to the Idaho Company. This money has been extracted from the Maryland property, and there is every reason to believe that this mine will develop into as rich a property as its famous predecessor.

Grass Valley, Feb. 20, 1894.

SAMUEL BUTLER.

The Greatest Mine in the World.

The report of the general manager for the half-year ending November 30, 1893, shows that the output of the Broken Hill Proprietary Company's mine, New South Wales, exceeded all previous records. During the half-year there were treated 260,047 tons of ore, showing an extract of about 10 per cent of lead and 25 ounces of silver per ton, and producing 333 tons of copper (in matte), 25,822 tons of lead, 1431 ounces of gold and 6,533,232 ounces of silver, as is shown by the subjoined statement.

PROCESS OF TREATMENT.	Ore Treated	Copper Matte.	PRODUCT.		
			Copper.	Lead.	Gold.
	Tons.	Tons.	Tons.	Tons.	Ozs.
SMELTING—					
Mine Furnaces.....	161,222	663	239	19,327	4,358,558
Port Pirie Smelting Works.....	46,813	150	59	4,039	68,740
Port Pirie Refinery Furnace.....	5,843			319	218,346
British Furnaces, Broken Hill.....	20,362	77	31	1,883	608,908
Less Flue Dust.....	234,240				12,920
	2,920				
AMALGAMATING.....	231,320	890	333	25,822	6,332,141
CONCENTRATING—	12,280				201,091
Crude Ore passed through Mill.....	21,452				
Producing Concentrates (included above in Ore treated) and Tailings.....	16,447	16,447			
	21,452				
REFINING.....					1,431
Grand total half-year.	260,047	890	333	25,822	6,533,232

* Equal to 251,278 ounces per week.

Rapid Shaft Sinking.

A recent discussion in relation to rapid shaft sinking on the Comstock lode led the *Territorial Enterprise* to the collection of the following statistics:

The Savage, Norcross and Chollar joint shaft, known as the Combination, has four full-sized compartments, each six feet in length by four feet in width, requiring an excavation nearly forty feet in length by seven in width to allow room for timbering. This shaft was sunk to a depth of more than 2500 feet, and closely timbered with 12x14-inch timbers, in two years, and several working stations were opened at the same time—each capacious enough for a dance-hall.

The joint Best & Belcher and Gould & Curry shaft, known as the Osbiston, was sunk to a depth of 2000 feet below the surface in 18 months. This shaft has three compartments. Both of the above shafts were sunk through a diorite formation, requiring heavy blasting for almost every foot attained in depth. A record of 110 feet a month has frequently been made by Comstock mining companies in sinking.

For rapid drift driving the Comstock has never been excelled. On the 3100 level of the Combination shaft a south drift was advanced 115 feet in one week, and this with a cloud of steam arising from the water in the sump showing a temperature of 120 degrees; meanwhile the ponderous hydraulic pumps were lifting to the Sutro tunnel level nearly 4,000,000 gallons of this steaming water every 24 hours. The speed of driving the Chollar drift is said to have been excelled in several instances, but that in the Chollar is the longest drift ever run on the Comstock at that depth below the surface.

THE Providence Mining Company, at Nevada City, is about to increase the capacity of its mill by the addition of ten more stamps, making 50 in all. The Providence will then have the largest mill in Nevada county. Under the efficient superintendence of Col. Davis it has developed into a most important property, and will doubtless continue to be a large producer for years to come. It has not been so very long ago—two or three years—since the Providence was a "worked-out" mine. There are many other such in California.

A Reply to W. S. Chapman.

By Samuel Butler.

I desire to utilize the columns of the PRESS in the interest of a class of men of which I am a unit, and for the purpose of debating certain statements of a correspondent which appeared in your issue of the 10th inst. I refer to an article under the caption of "Needed Changes in Mining Methods," from the pen of W. S. Chapman.

While there is little in the article to arouse the interest or excite the sympathy of miners in general, there is much to arouse the indignation and incur the enmity of the class of people against which it was principally directed. That the expressions will be condemned by working miners and also by mine-owners is a foregone conclusion.

In thus taking issue with this writer on an important question, it may be inferred by some that I am biased in my statements, arising from the fact of my following the avocation of a miner. But this fact shall not be permitted to prejudice my mind against the assertions made by Mr. Chapman to which I take strong exception.

In making what he evidently considers a strong plea for the more economical development of our mines, he remarks: "There is no reason why wages should remain as high as they are. While I am not in favor of reducing the workingman's wages as a rule (?), yet I think it would be far better for the unemployed to work in the mines for \$2 a day than to be seeking work in the Park or around the city, or any place where they may procure work, at \$1 a day, and most of the time having nothing to do at all."

It is a singular fact that whenever a system of economy is to be inaugurated in any business or industry where a large number of men are employed, the burden invariably falls upon the shoulders of the working classes—the great producers of the commonwealth, who more than any other class "earn their bread by the sweat of their brow." Mr. Chapman is not impervious to the errors of indifferent writers who have taken a similar position previous to the production of his own article. He has fallen into the same snare, and must bear the odium which such ill-advised statements incur.

It is very noticeable that, while the efforts of certain men are always in the direction of the reduction of the wages of the industrial classes, very little is written about economy in other departments where economy could be more properly and rigidly exercised. It is absurd and unjust to ask the working classes to submit to a reduction of wages while the price of labor in other departments remains intact. It clearly shows the bias of a writer's mind. Several reasons may be adduced to show cause why the wages of miners in California should remain unchanged. Every partial and sensible-minded person must admit that \$3 per diem is not too great a compensation for the noble and courageous men who risk their lives while exploring the subterranean depths in search of the precious metals. But few people have a conception of the hardships and dangers to which this class of toilers are exposed while engaged in the pursuit of their avocation; and I surmise that Mr. Chapman is among the class who are ignorant of the existing dangers—dangers to which no other industrial class is subjected—the exposure to caving ground, falling timbers, breaking of cables, explosion of powder, conflagrations, the inhalation of gaseous matter and other noxious effluvia, which have a tendency to bring the miner to a premature grave. This is only a partial list of the dangers to which miners are exposed, but decidedly enough to appeal to the sympathy and common sense of all fair-minded people. For this reason alone are they not deserving of \$3 per diem? But this is not the only reason why the standard of wages should be maintained in our mines.

Mining is a science like all other industrial professions. A man to be a competent miner should be a skillful miner. Brains, skill and energy are as essential to the accomplishments of a successful miner as they are to those of any other profession. Mining is a science that is never fully comprehended, as there is always something new to be understood and mastered. The idea prevalent that any person is capable of working in a mine is very erroneous and misleading; and Mr. Chapman's proposition to bring the unemployed of San Francisco to work in the mines would be productive of queer results. What percentage of the unemployed in the metropolis are miners? How many of them understand the rudiments of mining? It is safe to assert that not three per cent of the whole unemployed of this State understand the rudiments of mining. To bring this army of men into competition with our miners would be putting skilled labor against unskilled labor—a proceeding which would be degrading to the whole mining profession. A thousand such men in a mine could not accomplish as much in a day as one hundred skilled miners to run a drift, to sink a shaft, to stope the ground after it is opened, to put a pump in position and keep it in repairs, to timber a mine to keep the ground from falling—all these

things, however simple and unimportant they may seem to the novice, require skill and experience such as the horde of unemployed do not possess.

And this brings us to the consideration of another important phase of the question, namely, that the best paid labor is always the cheapest. To the uninitiated this may seem ridiculous, but it is a fact which all students of political economy must concede, and which all professors of that science have demonstrated, that skilled labor, however highly paid, is the cheapest labor. This axiom applies as strongly to the employment of miners as to the members of any other profession. Where is the printer who would put a workman on the "case" who was entirely ignorant of the art of typesetting; the machinist who would ask a novice to construct an intricate piece of machinery; the carpenter who would put an unskilled laborer to execute a difficult piece of work; an architect who would ask a miner to draw the plans of a modern residence; a tailor who would ask a farmer to make a suit of clothes? Echo answers where. If all these skilled professions refrain from employing unskilled labor, even though that labor can be procured at so much less per diem, why should the miners be subjected to the competition of a horde of unskilled men such as Mr. Chapman would introduce into their midst? If this gentleman will inconvenience himself to visit this burg, we will guarantee to enlighten him on a subject of which he appears to be ignorant.

SAMUEL BUTLER.

Trinidad Asphalt.

Col. F. V. Greene recently read a paper before the American Institute of Mining Engineers that gives some interesting facts about this product. He says:

The asphalt of Trinidad is found in a so-called lake situated about 100 feet above the sea and about three miles from the shore of the island, at the village of La Brea (the Spanish word for pitch). Its area is about 114 acres; its depth, so far as ascertained by certain rude borings, is reported to be about 18 feet at the sides and 78 feet in the center; and underlying it there is said to be a bed of blue clay. If these figures are correct, the lake contains about 6,000,000 tons of asphalt. Whether these borings are even approximately accurate is, however, very doubtful. It is even contended by some that the lake is still fed from underground sources. The only positive information on the subject is the fact that the excavations of the last ten years (about 180,000 tons) have not appreciably lowered its level.

The word "lake," applied to this deposit, is an entire misnomer. It is a level tract of brownish material having an earthy appearance. Cracks or fissures having a width and depth of a few feet appear here and there over the surface. Some of them are filled with rain water, while others have been filled with soil blown there by the wind and giving support to a scrubby vegetation. Some travelers have reported that the deposit is liquid in the middle, but such is not the fact. Carts and mules can be driven everywhere on its surface. The material is dug with a pick and shovel, loaded into carts, and hauled to the beach. Here it is placed in baskets, which are carried by coolies wading through the surf to lighters, and from these lighters it is loaded on vessels. During the voyage the material unites in a solid mass, and has to be removed again by the use of pick and shovel. On being unloaded, it is placed for about five days in large tanks heated by a slow fire. The moisture is expelled, the roots of trees and other vegetable matters are skimmed off the surface, the earthy matter with which it is combined settles by gravity, and the refined product is run off into barrels. The refining is in reality a mere heating to a liquid condition, in order to allow the sediment to deposit; and great care is taken not to heat the material to a point which will in any way change its chemical condition or produce distillation.

W. M. WILSON, a well-known mining man, has just closed a deal with capitalists in this city for gold properties in Arizona, the purchase price being \$100,000. The property is situated almost on the apex of the Hassayampa mountains, near Castle creek, about half way between Phoenix and Prescott. The ore is low grade, running about \$10 to a ton. It is what is known as Iron specular ore. Mr. Wilson states that there is enough ore on the surface to keep 50 stamps running. Extensive development work will be begun immediately.

IT IS PROBABLE that practical smelting will be added to the curriculum of the School of Mines at the Nevada State University. Professor Jackson, who has charge of that department, has had a quartz mill built and it is now in practical operation. The mill was built by the students under Professor Jackson's supervision, and the Board of Regents will very likely add a smelter so that the students can be practically educated in the art of reducing and smelting ores by every process now in practical use.

A New Centrifugal Chlorinator.

Mr. J. W. Sutton, of Brisbane, was engaged some weeks ago at the Mount Morgan gold mine in carrying out a series of trials on the various kinds of ore there with his small chlorinating, leaching and precipitating plant, capable of treating about two tons per day, the results being exceedingly satisfactory and promising in the near future to make a radical change in the present methods of gold recovery by the chlorination process. The process and apparatus are thus described by the inventor in *The Australian and Mining Standard*:

The chlorinator consists of a wrought-iron barrel lined with lead, containing a central tube perforated and covered with asbestos cloth; attached at the left-hand side of the barrel is a smaller one, also lined with thick lead and has a steam jacket. The whole is mounted on cast-iron trestles and driven with gearing at the rate of four to six revolutions per minute. The ore to be treated is slightly damped and let into the barrel by the doors on the top, from a hopper on the upper floor, and when quite full the hinged doors are screwed up; at the same time a sufficient quantity of salt, manganese and sulphuric acid to chlorinate the contents of the large barrel is put into the smaller one, and the whole set revolving. The chlorine which is at once given off from the mixture passes through an aperture into the central tube of the large barrel and percolates through the asbestos cloth into the ore, the revolving action always keeping the ore sufficiently loose for the gas to enter thoroughly among the ore, and at the same time keeps the chlorine mixture in the smaller one well agitated. When the evolution of gas begins to lag, steam is turned on until all the mixture is decomposed. Valves are placed on the side of the barrel to let out the common air while the gas is entering, thus insuring good and strong nascent gas.

Three hours is found to be sufficient time to convert the gold into chloride; the barrel is then stopped and the contents let into a bopper ready for leaching, at the same time the residue from the small barrel being run out. The leaching machine is a centrifugal similar to that used in drying sugar. It is driven direct by a small engine on top of the framing. The spindle which carries the basket has a coarse pitch thread its whole length, upon which works a drum, which, when down in the basket, leaves an annular space between it and the sides of the basket, which are perforated and lined with asbestos cloth. The ore from the bopper being let down on to the top of the drum, the centrifugal force slides it off into the annular space, and as soon as this is filled a friction cone on the drum top is brought into action, and it is withdrawn clear of a workman's head. A clear-faced body of ore is then revolving at about 300 revolutions per minute, water is turned on this face, and by the centrifugal force is sent direct through into the outer casing, carrying with it all the gold in solution. By this means of leaching only about one-tenth as much water is used as by the ordinary method of vat work, and the time required is only about seven minutes per charge of 10 cwt. When, by the usual test, the solution flowing from the outer casing gives no gold reaction, a small mechanical plow is introduced which scoops the spent ore out of the bottom into trucks or into shoots to be conducted to the waste tailing heap. The solution of gold is then run into the precipitator, which is a rectangular tank with a spindle driven through it from corner to corner and driven by pulley at about 40 revolutions per minute.

Into this precipitator is put sufficient sulphate of iron and kerosene oil, and when half full it is set revolving for about ten minutes, by which time the whole of the gold has been precipitated, and the precipitate thoroughly greased by agitation with the oil, so that when it comes to rest the water with the base metals in solution lies at the bottom, the gold and oil on the surface. A tap is opened and all the water runs away through a safety sand filter, and the oil and gold is then run into a receiver, and thence into a small centrifugal, whereby the oil is immediately separated, leaving the gold in the basket, from which it is simply scooped out and melted, and the oil is taken back for use over again. The plant is capable of treating 30 tons in 24 hours.

A BIG VOLUME of gas has been struck at 80 feet in the E. Archer well, says the *Salinas Journal*. The gas blew pebbles and sand as it came up with a roar through the 2-inch pipe. A match was touched to it, and it is burning to a height of about 12 or 15 feet. The volume of gas issuing from the well is estimated by experts to be sufficient for illuminating purposes for a town of 20,000 inhabitants. The only question is, will it last? Mr. Archer intends to "let her blow" for a while and if the supply continues strong he will make preparations to utilize it. Great crowds visited the locality to view the column of flame as it shot up into the air.

Auriferous Veins of Meadow Lake, California.*

By Waldemar Lindgren.

General Type.—Fissure veins containing auriferous sulphides and arsenides with gangue of tourmaline, quartz and epidote in granitic and diabasic rocks.

By far the larger part of the veins of the gold belt of California have a gangue of quartz alone or quartz with some dolomite or calcite, contain free gold besides sulphides, and occur in the sedimentary auriferous slate series or in the eruptive bodies, unaltered or dynamo-metamorphosed, which are connected with them; the large granitic areas are usually barren. The group of veins to be described here shows thus a type which in many respects differs from the ordinary. Indeed, auriferous deposits of this class do not appear to have been mentioned as occurring in any other part of the United States.

Location and Discovery.—The Meadow Lake mining district is situated in Nevada county, about ten miles north of Cisco, a station on the Central Pacific Railroad, at elevations ranging from 7,000 to 7,500 feet. The first divide of the Sierra Nevada, whose summits here reach 9,000 feet, is only eight miles distant toward the east. The climate is severe and snow sometimes falls to a depth of twenty feet on the level. A rough trail leads into the district from Cisco; a wagon road thirty-five miles long leads to Truckee by a circuitous route.

The mines were discovered in 1863 by H. H. Hartley, and a great rush took place to the district in 1865 and 1866. The free gold found at the surface soon gave way to relatively poor sulphides and the boom speedily collapsed. At various times subsequently some work had been done on the principal mines, and only recently the deposits have been subject of some discussion in the technical papers. Considering the difficulties of access and climate, there is some doubt as to whether any of the deposits can ever be worked with profit. The ores will not average more than from seven to ten dollars per ton at the most. Probably \$200,000 or \$300,000 have been expended in the district, while it is doubtful if more than \$75,000 have been taken out.

General Geology.—The area is of a rough, mountainous character, the elevations ranging from 5,800 to 7,800 feet. The vegetation is scant, the soil having been swept away by the Pleistocene ice sheet once covering the region, leaving enormous bare expanses of the prevailing granite rock.

Granodiorite.—A light gray granitic rock occupies the larger part of the area, and in it is contained nearly all of the veins. The rock is in general identical with the gray so-called granite that occupies such large areas in the Sierra Nevada and which probably extend through southern California far down into the peninsula of Baja California.

The rock consists of typical development of feldspar, quartz, biotite and hornblende with medium grained hypidiomorphic structure. The soda-lime feldspars are usually considerable and to a variable extent in excess of the alkali feldspars. The silica varies between 60 and 73 per cent; the amount of lime is variable, but it rarely exceeds while it usually falls somewhat short of the sum of the alkalis. While in some varieties which cannot be distinguished from the others in the field, there is more potash than soda, a frequently occurring relation is 2 per cent K_2O to 4 per cent Na_2O . It will be seen that the rock very closely approaches some quartz-mica-diorites and often might be indicated by that name.

This term, however, besides being clumsy, does not sufficiently express its close relationship to granite, brought out by its frequently high percentage of silica and low percentage of lime, by its variable percentage of alkali feldspars and by the muscovite sometimes occurring in it. On the survey maps of the gold belt of the Sierra Nevada, of which district Mr. G. F. Becker is geologist in charge, it has therefore been determined to indicate this rock as *granodiorite*, which term it is hoped will find general acceptance.

Age of Granodiorite.—The granodiorite is later than the quartzite slates of Signal Peak or Red Mountain north of

Cisco, which have been extensively metamorphosed by it. As these sedimentary rocks are the direct continuation of the series which a few miles farther south at Sailor canyon have been identified as Jura-Trias from the meager fauna occurring in them, the granodiorite evidently postdates that period.

At Meadow lake several interesting facies of the granodiorite occur. Near the diabase contact it appears darker and more basic by increasing hornblende. West of Meadow lake from the Keystone mine up toward French lake there is no biotite, but at many places a monoclinic pyroxene appears and the rock contains abundant titanite. At several places near French lake a peculiar augite-diorite occurs composed of quartz, plagioclase and augite; the areas of this rock, connected by transitions with normal types, are distinguished by the brilliant white color of the glaciated outcrops.

Diabase.—An area of diabasic rock occupies the eastern margin of the map, adjoined on the west by dark basic diorite. It is sometimes, as at Meadow lake dam, rather a ruralized diabase-porphyrity; at Fordyce dam, farther south, it is a biotite-diorite. The relations of the diabase to the granodiorite are not clear beyond doubt, but the latter appears to be the younger rock.

Andesite.—Several small masses of andesitic breccia of late Tertiary age cover the older rocks to the west of Meadow lake; north and east of it large masses of this volcanic rock appear.

Ore Deposits.—The granodiorite area contains between Signal Peak and Meadow lake a great number of black veins and seams composed of quartz, tourmaline and epidote, together with grains and smaller masses of pyrite. In certain places the latter mineral, and other sulphides have been formed to a large extent and are auriferous enough to render their exploitation possible. The strike is northerly or northwesterly, the dip vertical or at high angles to the northeast; the width of the veins is variable; sometimes, as at Excelsior, it reaches 12 feet. The walls are frequently indistinct. The veins near Meadow lake do not seem to be traceable for long distances, while some of those of Old Man mountain, which is a rounded granitic dome, traversed in several directions by fissure systems, appear to be continuous for half a mile or more. The country rock is not extensively altered in the vicinity of the veins. Many small veins occur at the contact of granodiorite and diabase near Meadow lake and a few are also found in the latter rock just south of the lake.

Ores.—The ores consist of iron pyrite, arsenical pyrite, pyrrhotite, zinblende, and rarely galena; on the decomposed surface much coarse free gold occurred which, however, was soon replaced by the sulphides mentioned and in which the gold occurs in extremely fine distribution.

Auriferous copper ores prevail at the Keystone, with cuprite, chrysocolla and other secondary minerals. At the most developed mine, Excelsior, iron pyrite is the most abundant ore. Silver does not occur to any notable extent in the ores.

Gangue.—While some white quartz with admixed sulphides occur, the usual gangue is a black, hard and dense rock of sometimes almost basaltic appearance, in which the ores are disseminated. In more coarse-grained specimens yellow epidote, quartz grains and small radiating aggregates of a dark brown tourmaline are visible. Under the microscope the black veinstone is resolved into an interlocking aggregate of quartz grains, occasionally traversed by cracks along which comminution and crushing has taken place; gas and fluid inclusions are plentiful; epidote and sometimes zoisite form aggregates in places; tourmaline occurs as irregular grains with the quartz, but much more commonly as slender crystals and radial aggregates intimately and plentifully imbedded in the quartz. The tourmaline has pleochroic colors varying from bright brown to dark bluish or greenish gray. Skeleton crystals are common, the interior being filled with quartz grains and bunches of radial chlorite. This latter mineral is quite common in some slides, sometimes traversing the tourmaline in small veins. Brown mica occurs in aggregates, together with tourmaline. A colorless mica, titanite, ilmenite and some calcite were also observed. The ores occur intimately intergrown with this gangue. In one case pyrite was observed surrounded by a ring of pyrrhotite.

In a small vein occurring where the trail to Meadow lake crosses Fordyce creek grains of a faintly greenish monoclinic pyroxene, and probably also a little albite, occur together with abundant quartz, tourmaline, epidote and pyrite. The occurrence of pyroxene in veins of this class is certainly not usual. Pyroxene is, however, not exclusively an igneous mineral; Daubree has long ago shown that it may be formed by the action of superheated water on glass containing iron, and, according to Brogger, it sometimes occurs in the veins of the syenite of southern Norway, together with zeolites and calcite in such a way

that it must be regarded as having been formed contemporaneously or even later than the zeolites.

From the data given above it appears probable that the larger part of contents of the veins should be regarded as country rock intensely altered by solutions containing heavy metals and boron, ascending along narrow cracks and fissures.

Somewhat similar deposits have recently been described by W. Moericke from Chili. In these occurrences a hornblende-biotite-granite of probably Tertiary age is in the vicinity of the veins altered to a tourmaline rock nearly identical with that here described; the veins proper occur in this tourmaline rock and consist of quartz with but little tourmaline, together with auriferous copper ores.

New Gold Extraction Process.

The extraction of gold in a simple and economical manner by an electrolytic process, capable of dealing with every kind of refractory ore, is stated to be the lately accomplished result of the long study and experiment on the part of a London chemist, says the *Philadelphia Record*. There are several electro-chemical processes already in use for obtaining gold from refractory ores, in which such deleterious substances as sulphur, iron oxide, arsenic, zinc, etc., are associated with the gold. But it is found that no one particular process is available for every class of ore. Hence much money is often expended on an extensive plant for treating a certain kind of ore, which has to be abandoned or supplemented by another plant, when the character of the ore changes. The main requirements in these processes are: First, the circulation of the pulverized ore between positive and negative poles; second, a solvent liquid for the gold; third, means of collecting the electrolyzed gold; and fourth, the concentration of the positive pole.

In the new universal process the first requirement is met by having a screw propeller set vertically near the bottom of the tank. The solvent is a dilute solution of potassium cyanide, and the collection of the gold is effected by a bath of mercury, which constitutes the negative pole. The positive pole consists of a mixture of powdered pitch or rosin, consolidated by heat.

In operation, the ore, mixed with a certain portion of water, is placed in the tank, with the bath of mercury at the bottom. On starting the screw the mixture circulates down the center of the tank and impinges gently upon the surface of the mercury. It then travels up the sides of the tank, which are conical and on which the positive pole is laid, and back, down to the center, to be again driven into intimate contact with the mercury. The gold is thus brought into contact with an active instead of a sluggish mercury surface, over and over again, until every particle of gold has been seized and absorbed.

It is stated that some of the most refractory and typically difficult ores have been submitted to this process, and that in some cases over 90 per cent of the contained gold was extracted.

The chief advantages claimed for the process are that the gold is extracted directly from the ore without any other preliminary treatment than crushing; that the same chemicals are used over and over again; that the process efficiently extracts the gold and silver from the auriferous ores, whether refractory or free; that the precious metals are obtained at once from the amalgam in the metallic state, without further chemical treatment, and that any workable quantity of ore may be treated in one vessel at one operation, and the gold obtained in one day.

Spelter, Copper and Lead.

The production of spelter in the United States in 1893 was about 74,500 tons of 2000 pounds, as against 83,619 tons in 1892.

The production of copper from domestic ores exceeded somewhat the output of 1892, notwithstanding a heavy reduction in the output of the Anaconda mine, which mine curtailed production when the market was low. On the other hand, the Calumet & Hecla considerably increased.

The production of lead in the United States declined only in domestic desilverized, which amounted to about 122,000 tons of 2000 pounds, and of antimonial lead 5300 tons produced. The sort lead of Missouri and Kansas was almost the same as in 1892 and amounted to 31,300 tons, while the lead produced from foreign ores amounted to about 23,000 tons, and foreign bullion refined here in bond to less than 35,000 tons. The entire production was, therefore, 159,600 tons from foreign ore and bullion.

DURING the month of January the Enreka and Palisade Railroad Company received in transit to Salt Lake and Vallejo Junction, Cal., 1226 tons of ore from Eureka district and other mines, as follows: From the Diamond, 747 tons; Eureka Con., 181 tons; Jackson, 105 tons; Richmond, 87 tons; Phenix, 46 tons; Idaho, 41 tons, and Hamburg, 20 tons. There were no shipments from White Pine, the ore teams having all been laid off for the winter.

*Meadow Lake district (formerly Excelsior) was at one time the center of a vast amount of interest in California. Soon after its discovery there was a great exodus to the camp; and in a very short time mills were erected, mining operations were in active operation, and a city had sprung up on the shores of the lake. But the unprofitable character of the ore was soon apparent, and the population of the district vanished as rapidly as it gathered. Buildings—some of them brick—were left with their furniture, mills with their stamps complete. It is the most pitiful instance of the sudden rise and equally sudden death of a mining camp in the history of California, though there are parallels in Nevada. For the past twenty-five years there have been various attempts to revive interest in the district, and the "process man" has often attempted to work the ore. The belief, long cherished, in its high value has been gradually subsiding, until lately the truth is known. The accompanying paper is a valuable contribution to technical literature on the subject, and will be especially interesting to the many who know the history of the district, and, perhaps, shared in it. It may be interesting to know that H. H. Hartley, discoverer of the Meadow Lake veins, died about a year ago after thirty years' residence in the district, during which time his faith in its value never wavered. His widow is said to be now in San Francisco endeavoring to carry out his life work—to secure capital for the development of the Meadow Lake mines. The paper is from the *American Journal of Science*.—EDITOR PRESS.

Hydraulic Mining.

A REVIEW OF THE INDUSTRY BY DR. HENRY DEGROOT.

In Eight Parts—Part VIII.

The Undercurrent.—This is a large, shallow kind of sluice from 20 to 50 feet wide and 40 to 50 feet long, with sides 16 inches high, set on a heavy grade at the side of and a little below the main sluice, the design of it being to relieve the latter of the finer material and permit of its handling the remainder more effectually. This structure is located at a point where there is grade to spare for a drop in the main sluice, across which there is here set an iron

inch plank, tongued and grooved, is set on an eight to ten per cent grade. It is paved with cobbles or small blocks. The gravel escaping from the undercurrent is caught in a side sluice and returned to the main line.

Formerly a sort of subsidiary undercurrent set beside and below the principal structure was in use, but they have latterly come to be discarded.

A view of the latest style of undercurrent with its details is shown in the accompanying cut.

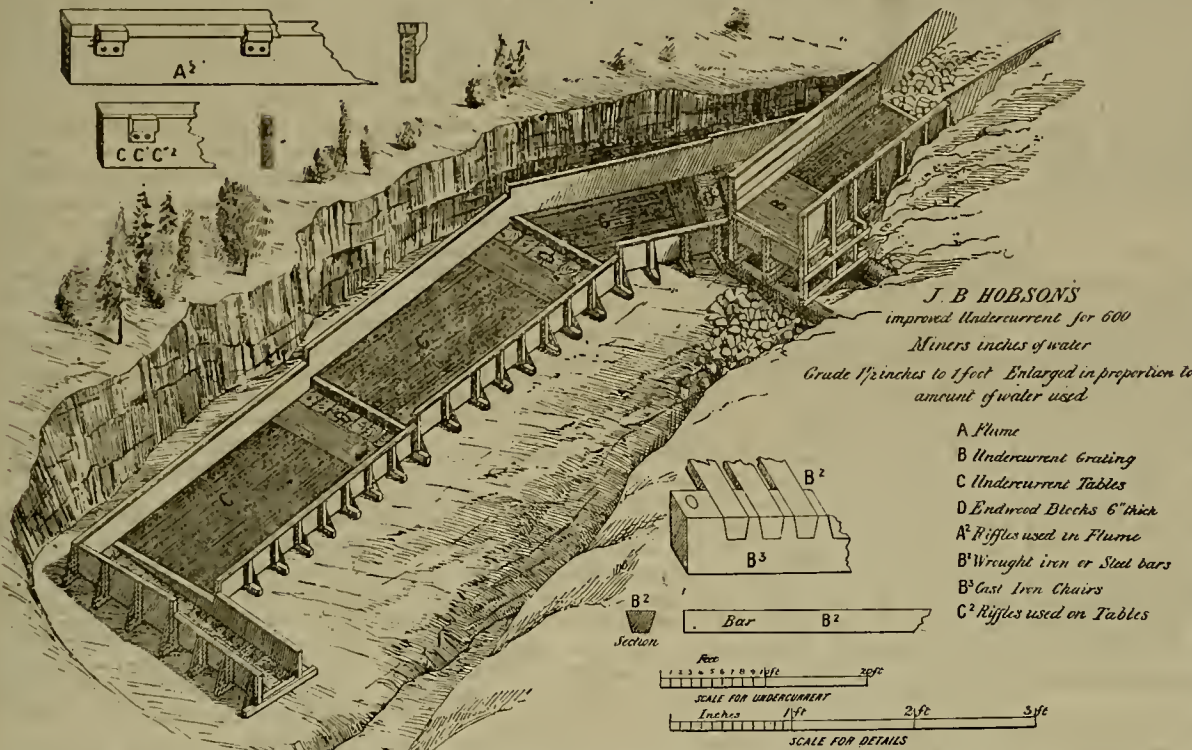
Miscellaneous Items.—In size, hydraulic claims are apt to cover a large area. Longitudinally, they extend from half a mile to four or five miles, running with the course or

method of measurement being adopted where the banks are shallow and therefore of large area. A cubic yard of gravel in place varies in weight from one and one-half to one and three-fourths tons, the weight when broken down being somewhat less.

The causes of the disparity appearing in the tabulated exhibit requires some explanation. That the product of gold per cubic yard and the cost of labor, water, explosives, should have been so much less during the earlier part of the period over which operations extended was due to the fact that during these earlier years the material washed consisted of the top gravel, which, being loose, required fewer explosives for breaking it up, as well as less water for running it off; it being at the same time poorer in gold than the gravel lower down. The latter being heavy and cemented, required not only more powder to loosen it up, but also more water to carry it into and through the sluices, which, it will be observed, were kept on the same grade all the while. As a matter of course, the banks on either hand grew higher as washing was carried to greater depths.

The wages paid by the hydraulic companies in California range from \$2 to \$4 per day, the latter to superintendents and foremen. In the drift mines a larger number of men are engaged, but here many of them are Chinamen, whereas the hydraulic companies employ only white labor.

The money invested in the hydraulic mining properties in California approximates \$100,000,000. Some of the larger companies have expended each fully \$3,000,000, this including purchase of property, cost of prospecting and equipping with plant. These mines were, at the time they were enjoined, making an annual output of between six and seven million dollars. Had they been permitted to continue operations, this output would by this time have amounted to ten million or more annually. This business, at the time it was arrested by legal proceedings, had been brought to a high degree of efficiency, its methods and mechanisms, through long and costly experiment, having been thoroughly perfected. As a consequence it had become not only the least hazardous, but the most profitable style of mining extant.



grating. Through this grating the finer material drops into a box paved with blocks and set at right angles to the main line of sluice; the coarser stuff which passes over the grating being picked up by sluices set on a lower level, the box meantime discharging its contents through a chute into the undercurrent. This chute, which is paved with cobbles

supposed course of the Pliocene or other channel on which they are located. As these channels are sometimes very tortuous, these claims require to be of considerable width in order to cover all their bends and angles. The titles of all the large and many of the smaller companies consist of United States patents. The right to carry their ditches

put would by this time have amounted to ten million or more annually. This business, at the time it was arrested by legal proceedings, had been brought to a high degree of efficiency, its methods and mechanisms, through long and costly experiment, having been thoroughly perfected. As a consequence it had become not only the least hazardous, but the most profitable style of mining extant.

YIELD OF GRAVEL, TOTAL AND PER CUBIC YARD, AT LEADING HYDRAULIC MINES IN CALIFORNIA

NAME OF MINE.	LOCATION.	Cubic Yards Washed.	Gross Yield.	Yield per Cubic Yard.	Average Height of Bank in Feet.
Shafts of North Bloomfield Co.	North Bloomfield, Nevada Co.	40,321,630	\$3,362,000 00	\$0 12.6	200
American.	Sebastopol, Nevada Co.	6,171,334	1,241,240 00	24	120
French Corral.	French Corral, Nevada Co.	4,200,000	1,746,600 00	41.6	20-100
Manzanita.	Manzanita, Nevada Co.	6,730,000	1,483,733 37	22	50-150
McCarty.	Columbia Hill, Nevada Co.	3,000,000	848,688 10	28	43
McGarry.	Patrickville, Stanislaus Co.	155,347	20,197 07	13	38
Delaney.	Patrickville, Stanislaus Co.	27,250	11,009 00	40.4	18
Chesnut.	Patrickville, Stanislaus Co.	71,810	9,847 48	13	56
Chesnut.	Patrickville, Stanislaus Co.	284,932	47,781 73	16	12-62
Chesnut.	Patrickville, Stanislaus Co.	838,330	62,930 37	18.6	60
Chesnut.	Patrickville, Stanislaus Co.	667,347	45,611 81	6.8	38
New Light.	Patrickville, Stanislaus Co.	683,244	46,444 65	6.6	24-60
Johnson.	Patrickville, Stanislaus Co.	196,632	9,148 27	4.6	80
New.	Patrickville, Stanislaus Co.	17,796	773 72	4.3	42
Kelley.	La Grange, Stanislaus Co.	88,660	3,406 33	4	85
Kelley.	La Grange, Stanislaus Co.	351,162	43,163 26	12.3	76
Kelley.	La Grange, Stanislaus Co.	701,636	15,770 34	2.2	100
New Kelley.	La Grange, Stanislaus Co.	161,032	8,552 31	5.3	40
Now Kelley.	La Grange, Stanislaus Co.	252,614	35,012 33	13.8	66
French Hill.	La Grange, Stanislaus Co.	1,000,100	64,650 27	6.4	40-65
French Hill.	La Grange, Stanislaus Co.	262,614	35,136 72	13.8	46
French Hill.	La Grange, Stanislaus Co.	676,968	90,188 19	13.3	10-48
French Hill.	La Grange, Stanislaus Co.	1,020,847	188,493 11	16.6	30
Light.	La Grange, Stanislaus Co.	746,640	64,714 27	8.6	43
Blue Point.	Plumas Co.	139,944	115,723 13	1 23	57
Green Flat.	Plumas Co.	22,000	16,000 00	67.5	16
Fale's Hill.	Plumas Co.	26,000	4,794 49	19	76
Crawford.	El Dorado Co.	77,880	35,046 00	45	85
Gold Run District.	Piacer Co.	43,000,000	2,074,356 00	4.8	(7)

TABULATED DETAILS OF WORK DONE BY NORTH BLOOMFIELD COMPANY DURING YEARS MENTIONED—QUANTITY OF GRAVEL MOVED—YIELD—COST OF LABOR AND OTHER FACTORS OF PRODUCTION.

	1874-1875.			1876-1876.			1876-1877.		
	Total.	Per Cubic Yard.	Per Inch of Water.	Total.	Per Cubic Yard.	Per Inch of Water.	Total.	Per Cubic Yard.	Per Inch of Water.
Cubic yards of gravel moved.	1,858,000			2,919,700			2,293,900		
Yield.	\$ 74,271 77	\$ 9.99 cents	19.19 cents	\$192,735 73	6.60 cents	27 63 cents	\$290,775 43	12.68 cents	48.87 cents
Expenses—Labor.	\$ 22,790 39	1.23 cents	6.89 cents	\$ 40,976 85	1.40 cents	6.85 cents	\$ 63,742 78	2.84 cents	9.03 cents
Explosives.	2,944 94	0.16 cents	0.76 cents	10,279 73	0.35 cents	1.47 cents	26,376 16	1.11 cents	4.26 cents
Blocks.	3,907 26	0.16 cents	0.78 cents	6,212 63	0.18 cents	0.76 cents	5,760 43	0.26 cents	0.97 cents
Material.	6,663 89	0.30 cents	1.46 cents	9,250 46	0.32 cents	1.33 cents	10,168 73	0.44 cents	1.71 cents
Water.	14,480 40	0.73 cents	3.74 cents	24,740 97	0.76 cents	3.11 cents	21,765 83	0.96 cents	3.66 cents
General.	4,201 95	0.23 cents	1.09 cents	7,364 12	0.25 cents	1.06 cents	25,266 11	1.10 cents	4.25 cents
Totals.	\$ 53 088 83	2.86 cents	13.72 cents	\$ 94,823 76	3.25 cents	13.56 cents	\$142,060 08	6.19 cents	23.88 cents
Days run.	296, com. Jan. 1, end.		Oct. 14.	342, com. Nov. 13, end.		Oct. 18.	318, com. Nov. 26, end.		Oct. 13.
Grade of sluices.	6 1/2 inches to 12 feet.			6 1/2 inches to 12 feet.			6 1/2 inches to 12 feet.		
Height of banks.	180 feet.			260 feet.			318 feet.		
Inches of water.	386,972.			700,000.			695,000.		

and set with dividers of wood whereby the flow is distributed evenly over the undercurrent, has a two to three per cent grade and narrows toward its lower end.

The undercurrent, the bottom of which is made of 1 1/4-

over the public land is secured to the miners by law.

The value of the gravel piped off in hydraulic washing is measured by either by the cubic yard, by the number of inches of water used or by the yield per acre, the latt

A New Gold-Extractor.

Mr. Saupe, of Melbourne, has shown us a plan of a new quartz crushing machine invented by him, says the *Mining Standard*, which is designed to operate without the use of water. The material is fed into the pan of the crusher, and when pulverized is drawn out by means of an exhaust pan, and is thrown into a screen in the separator or extractor. This screen, revolving, is covered with wire gauze of four different gauges, and delivers the crushed material into four hoppers, from whence it is blown on to their respective tables, depositing the matter into hoppers in degrees of fineness regulated by gravity. The gold is then separated from the hater matter and deposited in its box. Mr. Saupe has been highly complimented on his invention by many practical men.

The Water Supplies in the Arid Regions.

Part I.

By J. W. Powell, Director of the U. S. Geological Survey.

In the western half of the United States agriculture is in part dependent upon irrigation, or the artificial supply of water. The extent to which such agriculture can be carried on depends, first, upon the amount of water which a growing crop requires, and, second, upon the amount of water which can be artificially supplied. In considering these questions it is necessary to use some unit for the measurement of water, and for this purpose one that is simple and practical is readily found. Land is usually cultivated by acres, and water can be measured in terms of acres. An acre of water one inch deep may be known as an *acre-inch*, and an acre of water one foot deep may be known as an *acre-foot*. The first problem to be solved is this: How many acre-inches of water are necessary for the adequate supply of an acre of growing crop for one year? There are two methods by which this can be determined, and it is found that substantially the same conclusion is reached by either method.

I. THE AMOUNT OF WATER REQUIRED.

1. For more than a century scientific men have been engaged in determining the amount of water which various plants will consume through their roots and exhale through their leaves, the process being known as transpiration. This investigation has been pursued by various methods and by different men, and a common general result has been obtained. It has been found that different kinds of plants require varying amounts of water. Deciduous trees require more than coniferous trees with needle-shaped leaves. In general, grasses, vegetables, cereals and fruits require a relatively large amount of water, as will be seen by the following statements:

Grass growing in turf will transpire in one day a weight of water a little greater than the weight of the dried grass.

Many vegetables will exhale in one day an amount of water as great or greater in weight than the dried plants.

Cereals, such as wheat, oats, barley and corn, will exhale their dry weight in water every day.

Perennial vines and trees that bear fruit, such as the grape and the apple, will exhale every day a weight of water equaling the weight of the dry growth of the year.

Assembling these facts, the following general statement can be made: All average cultivated plants will daily exhale an amount of water equal to the dry growth of the plant for the year. This growth is effected in varying times with different plants. Some plants continue their growth for 75 days, others for 150, or even longer; but in general the plant requires for good growth water amounting to about 100 times the weight of its yearly growth when dried. Thus, a ton of hay requires 100 tons of water for its growth. The hay is not perfectly dry, but the loss by complete drying about equals the weight of the dry stubble and roots. An acre-inch of water weighs 226,600 pounds, or about $11\frac{1}{2}$ short tons. Two tons of hay require 200 tons of water, which is about 18 acre-inches. If the crop of hay on an acre is two tons the grass will transpire 18 acre-inches of water.

The Duty of Water.—We thus turn proportions into measured quantities by acres of crop and acre-inches of water, and we have a statement of the acre-inches of water which it is necessary to supply to an acre of growing crops for one year, which may be called the "duty of water." This duty of water, then, as here defined, is the amount of water in acre-inches which will be required by an acre of growing crop for one year. In stating this duty of water it will be given for an average growth, not for the maximum growth, as will afterward be explained.

When There Is Variation.—There are variables to be considered in this problem; that is, the duty of water will depend upon latitude, altitude, humidity of the air with clearness of sky and kind of crop. In northern latitudes plants need less water than in southern; in higher altitudes plants need less water than in lower; in more humid conditions of the air plants exhale less water than in arid conditions, though there seem to be some curious exceptions to this; and, finally, some plants require more water than others. But these variations are not so great but that they may be safely neglected for the general statements herein proposed, and it may be stated that an acre of average growing crop will require a mean supply of water of 18 acre-inches. This will be called the absolute duty of water.

Absolute and Possible Duty.—When water is applied to the land by pipes and all possible precautions against evaporation are taken—the ground well prepared and the water applied in such a manner that there is no loss by overflow, no loss by seepage, and a minimum loss by evaporation either by reason of mulching or shallow surface cultivation—at least two acre-inches of water will be lost by evaporation from the soil. We have, then, the absolute

duty of water as 18 acre-inches and the possible duty of water as 20 acre-inches.

The Practical Duty.—For average crops, all water given to the land in excess of this amount evaporates from the surface of the land or runs away over the surface and underground, and is therefore wasted. But all such waste of water cannot be avoided except at an impracticable cost. In putting the water on the land some amount must necessarily be evaporated. Under good conditions of cultivation, therefore, it is believed that six acre-inches of water must be added to the 18 inches; so that, in the western half of the United States, the mean absolute duty of water, plus the practically unavoidable evaporation, is 24 acre-inches for every average acre of crop. Otherwise stated, an acre of growing crop will drink up by its roots and exhale by its leaves an acre of water 18 inches deep during one season, and in applying this water under economic conditions an acre of water six inches deep must be wasted by evaporation. The absolute duty of water is 18 inches; the possible duty, 20 inches; the practical duty, 24 inches.

EXPERIENCE SUSTAINS SCIENTIFIC INDUCTION.

2. When the last census was taken it was found that an area of about four million acres of land was cultivated by irrigation in the western half of the United States. These lands were scattered widely over the whole region in small tracts; so that the experience of irrigators in this country is already extensive and highly diversified in relation to latitude, altitude, atmospheric humidity and crop. In taking the census many other facts were collected, and among these were the amounts of water actually supplied to the lands by the farmers themselves. It was generally found that the farmers are putting more water on the land than is really necessary, and that this extra amount is usually recognized by irrigators as excessive. The excess occurs in part through evaporation and in part by overflow onto other lands not irrigated, and still another part is lost underground by seepage. The general average in practice was found to be about 30 inches. It was further found, however, that in a few places, where for economic considerations great care was demanded, the duty of water was actually brought down to nearly 20 inches. Thus the widely diversified experience of the farmer is a reasonably approximate confirmation of scientific induction. But this 20 acre-inches is sufficient only when the water is carried in watertight canals or in pipes, and the ground is thoroughly prepared for its reception, and the most advantageous methods of applying the water are used. Excluding the very exceptional cases, good practical irrigation requires 24 acre-inches of water. Any amount additional to 24 inches put upon the land is not only wasteful of water, but injurious to the crop, as will hereafter be shown.

The conclusion is thus reached that the mean absolute duty of water for the arid region of the United States is 18 inches, the mean possible duty 20 inches, and the mean practical duty 24 inches; and all water put upon the land in excess of 24 inches is an injurious duty.

Important Qualifications.—With regard to the duty of water, as heretofore set forth, some very interesting and important qualifications should be made. The quantity of water which has been given as necessary for growing crops is for average crops, not for maximum crops. It has been found by numerous experiments that the growth of most crops can be greatly increased by providing conditions for the utilization of a greater amount of water. If the soil is underdrained and properly prepared, and the water supplied with the proper fertilizers, a much larger production can be realized than that which our farming usually secures. The water supplied to the plant is the vehicle of the materials wrought into the plant. Those who have studied this subject with great care state that the crop can be doubled, or even multiplied five-fold, by properly supplying it with water and plant food. But, under these circumstances, water supply must be increased proportionately. Suppose the farmer could control all the conditions, as the gardener can in his hothouse covered with glass, then 150 or more bushels of wheat, barley or corn could be raised on an acre of land. But 60 to 100 inches or more of water would be necessary. Again, it is found that in order to secure the maximum growth of plants, certain careful conditions of supply must be observed. Some plants will grow in water; a few cultivated plants will grow in marshes.

It is found by experiment that the growth of the plant will be checked by checking the water supply, which must be continuous to the most successful; that if checked the plant adapts itself to the new conditions, and, if afterward the normal supply is given, the plant will not avail itself of the better condition. It is also found that if the plant is urged to its greatest capacity by the best conditions during the early part of its growth, and until the grain or fruit has nearly attained its full size, and the water supply is then diminished, the yield will usually be increased and improved in quality; if the leaf growth is then checked, the fruitage is increased.

Sonora Mines.

Mexico enjoys a well-merited reputation for the extent and richness of its numerous mining properties that extend throughout a vast portion of its territory. The State of Sonora, Arizona's nearest neighbor to the south, possesses its full share of notable properties, both gold and silver production, and among them the Colorado mine, not far from Torres station, is a constant contributor to the gold output of that section of the country, says the Arizona Enterprise.

This mine is situated nearly due south of Tucson, and is reached by a run of twenty-four hours from Benson over the Arizona & New Mexico Railroad. The train stops at Torres, the station from which the mine is reached, for breakfast. This point is ninety miles from Guaymas, and has an elevation of 700 feet above sea level. The mine lies thirteen miles east of the station, 600 feet higher, and is reached over one of the best roads in the country. The well-known Minas Prietas is but a quarter of a mile distant from the Colorado, but its old-time activity has departed.

The Colorado has reached a depth of 550 feet, with extensive drifts at its several levels. At 500 feet the ore body is from 14 to 24 feet wide, and this level is now being worked. The 400 level has nearly 1,000 feet of development, and the 300 level has about 1,600 feet. The mine is well opened from the first to the fifth level, exposing a very large body of ore. Superintendent Howell Hinds says there is sufficient ore in sight to supply the thirty-stamp mill and twelve Frue vanners and the Huntington mill for ten years. This mill treats ten tons every twenty-four hours, and the concentrates average \$175 per ton. The thirty-stamp mill treats eighty tons per day, and from fifteen to twenty tons are shipped.

About 350 men are employed in various capacities about the camp. Common laborers receive from \$1.25 to \$1.50 per day in Mexican coin, and are paid daily if they so desire. Some of the natives are paid \$2 to \$2.50. American mill men receive \$4 to \$7 in gold, and this class includes shift bosses, foremen, mill men and engineers. Wm. McCormick is foreman of the mill; James Goodman is chief engineer; Z. Taylor and Geo. Shelly are engineers at the mine. Pedro Pinelli is acting as foreman of the mine during Jerry Holland's illness.

Thirty thousand galloons of water are taken out of the mine every day. This, added to that pumped from a canyon three miles distant, gives the company plenty of water. The tanks are of stone and built at a higher elevation than the mine and have a capacity of 160,000 gallons. Electricity is used for lighting purposes, and lights are placed in the various offices and residences.

The hoist has been enclosed with a high board fence to further prevent people from stealing the rich ore.

Superintendent Hinds must be highly commended for his satisfactory management of the property that has always met the cordial approbation of the Mexican authorities. While others complain of their treatment, this company has had no cause for regret at having made its investments in Mexico, and Mr. Hinds says that if foreigners will act honestly with the Mexican people they will meet with honest treatment in return.

The Criston mine is about 4,000 feet southeast of the Colorado mine. A pipe line is being laid and the engine is in place. A double-compartment shaft has been sunk 160 feet, and a Huntington mill will begin work on the ore of this promising claim. Many tons of arrastra tailings can be seen surrounding this property, where Indians mined many years ago. Superintendent Howell Hinds and Pedro Negro own the property.

At the Minas Prietas water is being pumped from the 600-foot level for the Grand Central mine. This mine is on the same lode as the Colorado, which is the only formation carrying water in that vicinity. The tailings of the Minas Prietas have been worked by the cyanide process very successfully during the past year. It will require at least two years yet to complete the work.

The Las Amarillos has been worked sufficiently to demonstrate its great value. Chicago parties are negotiating for an interest in it. Pedro Negro says over 700 feet of work has been done, and from a number of assays made the lowest was \$20, and from that up to \$233 per ton. This is a very promising claim and is partly owned by Pedro Negro and Jerry Holland.

The Grand Central mine lies west of the Colorado, with but one intervening claim. The shaft is now down 400 feet with a 40-foot ledge to work on, which is said to average \$20 per ton. The shaft will be sunk 100 feet deeper. This mine was worked on a lease by the Minas Prietas company, and up to the expiration of their lease they had taken out over \$1,000,000. For the past year a ten-stamp mill has worked twenty-eight tons daily. Superintendent Seymour and family reside at the mine. E. A. Brown and J. R. Emerich are at the mill.

Scientific Progress.

The Canals of Mars.

The straightness of the so-called canals on the planet Mars makes an explanation of their presence difficult, says an exchange. There is no parallel on this earth. They are too straight to be cracks in the surface, rivers or mountain ranges. Carl Winslow says that the cause must be looked for in other heavenly bodies, as it is probably too powerful to be found in the planet itself. A planet, an asteroid, striking Mars would make a straight line on the surface where it scored it, and the theory that the peculiar straight marks observed on the planet are caused by collisions is supported by the fact that Mars is more exposed to such collisions than any other planet. Between Mars and Jupiter are innumerable asteroids. Their orbits are very eccentric, and some of them are at times nearer the sun than to Mars. As their orbits traverse that of Mars, the possibilities of collisions are the greater. If the collision is tangential the meteorite will make grooves or furrows like those now known as canals. This will happen when the velocity is greater than that of Mars. If very great, the meteor will continue its course. Another theory is that the canals which have caused such widespread comment are but optical illusions.

The Heat from the Sun.

Those who have paid attention to this subject are aware that the remarkable doctrine first propounded by Helmholtz removed all real doubt from the matter. It is to this eminent philosopher we owe an explanation of what at first seemed to be a paradox. He explained how, notwithstanding that the sun radiates its heat so profusely, no indications of the inevitable decline of heat can be as yet discovered, says the *Fortnightly Review*.

If the sun had been made of solid coal from center to surface, and if that coal had been burned for the purpose of sustaining the radiation, it can be demonstrated that a few thousand years of solar expenditure at the present rate would suffice to exhaust all the heat which the combustion of that great sphere of fuel could generate. We know, however, that the sun has been radiating heat, not alone for thousands of years, but for millions of years. The existence of fossil plants and animals would alone suffice to demonstrate this fact.

We have thus to account for the extremely remarkable circumstance that our great

luminary has radiated forth already 1000 times as much heat as could be generated by the combustion of a sphere of coal as big as the sun is at present, and yet, notwithstanding this expenditure in the past, physicists declare that for millions of years to come the sun may continue to dispense light and heat to its attendant worlds with the same abundant prodigality. To have shown how the apparent paradox could be removed is one of the most notable achievements of the great German philosopher.

What Helmholtz did was to refer to the obvious fact that the expenditure of heat by radiation must necessarily lead to shrinkage of the solar volume. This shrinkage has the effect of abstracting from a store of potential energy in the sun and transforming what it takes into the active form of heat. The transformation advances pari-passu with the radiation, so that the loss of heat arising from the radiation is restored by the newly produced heat derived from the latent reservoir.

Such is an outline of the now famous doctrine universally accepted among the physicists. It fulfills the conditions of the problem, and when treated by arithmetical calculation it is not found wanting.

The Formenophone.

The formenophone, quite recently invented by Mr. M. E. Hardy, is an apparatus designed to trace in air the presence of any gas having a different density. His fundamental idea is as follows: It is a well known acoustic principle that if two organ pipes of the same pitch are sounded simultaneously by means of blowers, fed by pure air, we hear a simple sound; but if we force through one of these pipes pure air, while the other is thrown into vibrations by means of a mixture of air and gas, the sound of the latter pipe is correspondingly modified; consequently when the two pipes are sounded simultaneously, a certain number of interference heats will be heard, depending upon the quantity of gas contained in the air with which the pipe is fed.

The formenophone, the apparatus by means of which this experiment may be made, consists of two blowers and two pipes exactly alike. One of the blowers and its appropriate pipe is enclosed in an air-tight box containing pure air. The other pipe is fed by a mixture of air and gas. Each experiment takes but a short time, lasting perhaps a few seconds.

The formenophone is directly applicable to the detection of the quantity of coal gas in coal mines, and may be so constructed as to

give continuous indications not only in the mine, but also in the chief engineer's office.

If used for this purpose, a microphone with a receiving telephone is placed upon each organ pipe. When the two pipes are in unison, the sound is clearly reproduced by the telephone, likewise any interference heats that may occur.

To avoid the trouble of holding the telephone constantly to the ear, M. Hardy substitutes for it an amplifying microphone consisting of an electro-magnet mounted upon the poles of a permanent magnet. A vibrating steel spring carries upon its free extremity a conical piece of carbon. Another light, insulated spring carries a flat disk of carbon which lies upon a conical piece of carbon. The current of a local battery traverses the two carbons, and then passes through a large receiving telephone fastened to the wall of the room. Thus the receiving telephone repeats the sound of the microphone amplifying the latter about 400 times, and any heats are easily heard throughout a large room.

Professor Tyndall's Daring.

The late Professor Tyndall thought no labor too great and no risk too excessive to be undertaken on behalf of his beloved mistress, Science. One experiment he conducted specially illustrated this. Knowing a layer of iodine placed before the eye intercepted the light, he determined to place his own eye in the focus of strong invisible rays. He knew that if in doing so the dark rays were absorbed in a high degree by the humors of the eye, the albumen of the humors might coagulate; and, on the other hand, if there was no high absorption, the rays might strike upon the retina with a force sufficient to destroy it. When he first brought his eye, undefended, near the dark focus, the heat on the parts surrounding the pupil was too intense to be endured. He, therefore, made an aperture in the plate of metal, and, placing his eye behind the aperture, he gradually approached the point of convergence of the invisible rays. First the pupil and next the retina were placed in the focus without any sensible damage. Immediately afterwards a sheet of platinum foil placed in the position which the retina had occupied became red hot.

Liquid Fuel in Germany.

Liquid fuel, in the form of petroleum refuse, has been tried with such success by the German naval authorities on a small scale that Signor Cuniberti of the Italian navy, has been invited to visit Germany and conduct further experiments.

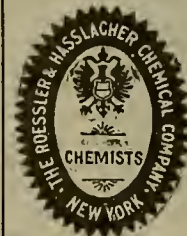
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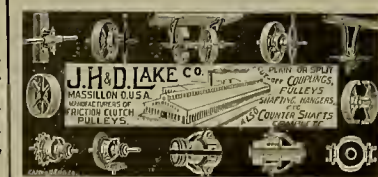
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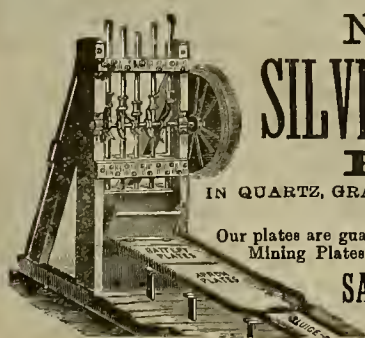
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Steel in Car Construction.

At the December meeting of the Western Railway Club, Mr. J. D. McIlwain, of the Harvey Steel Car Works, gave an interesting description of the cars exhibited at the World's Fair in whose construction steel was employed to a greater or less degree, and also of the extent to which that metal is used in other countries. He stated that it has been demonstrated that a steel-frame car can be built that will embody 150 per cent, or $2\frac{1}{2}$ times greater resisting strength, at least 300 per cent longer life, cost 50 per cent less for maintenance, and weigh 15 to 20 per cent less than the modern American wooden car. As to its being necessary to have special machinery to repair steel cars, he stated that every well-appointed railway locomotive and car shop is equipped with punches, shears, cold saws, bulldozers, etc., and that is about all that is needed to frame and form material for renewals and repairs of steel parts. If standard sections are used, very little forging will be necessary.

If put together on car-building lines, and not like a boiler, it will be as easy to remove and repair bent or defective parts as in a wooden car. The evolution would be gradual from wood to steel. The same would be the case with appliances for repairing. The cost for any change in the repairing plant would be small compared to the reduced amount of repairs required with the use of metal frames. In European and other foreign countries the evolution from wooden to metal cars has been quite rapid. It having been demonstrated that the metal car costs much less for maintenance than the wooden car, yet the difference in cost of metal and wooden cars is much more than it is or will be in this country, as they build a car there without much regard to future cost of maintenance, which is a very important item in this country. Thus far our metal cars have been built with a view to future maintenance, which is a consideration absolutely necessary.

The question of dead weight is of considerable importance. To obtain a steel car with 15 per cent less weight than a wooden car of the same capacity means a saving in cost for haulage of 15 per cent, which insures a less number of cars to do the same amount of business, a less number of cars to maintain and renew, making a very marked reduction in the cost of rolling stock.

Fire-Resisting Glass.

Glass having unusual fire-resisting properties has recently been produced in Germany, and competitive tests have been held to ascertain the merits of samples from several factories. The glass was put into the vertical windows and skylights of an old building which was then set on fire, and sudden changes of temperature, shocks from weights and jets of water and other means were employed to prove its toughness. Excellent results were attained, especially by the glass from the Siemen works in Dresden, which withstood a temperature of 2140 degrees Fahrenheit for half an hour.

Speed of Trains.

The real danger in increasing the speed of expresses driven by steam does not lie in incidental risks. It is not denied that modern locomotive might be built which could run up to 90 or possibly 100 miles an hour, if the lines were straight. It is the curves of the existing lines which render any such speeds impossible, unless the weight of the engines and trains were also increased far beyond what the bridges and permanent way would bear. At the first sharp curve the 100-mile express would fly off the rails. The necessary relation of these curves to speed is accurately known, and it is that, and not the lack of power,

or novel dangers from wind pressure or boiler explosions, which sets the limit to modern train speed. As the force tending to throw off the line a train running at the speed of 150 miles an hour would be about six and a half times greater than that which a steam express train resists at a curve when running at 62 miles an hour, it is plain that the present lines could not be used for the "lightning express," even though the electro-motor were substituted for the steam engine. The lines must not only be stronger, but straighter than would be possible by any modification of their present forms.—Kuhlows.

Nature's Models.

When a man competes with Nature in engineering problems he is left far in the rear, says the *Engineer*. This is particularly the case in the appliance of power for speed. The wild duck is about the last bird we should expect speed from; it has enormous surface, is very heavy forward, and has a comparatively long neck and a heavy head, with all it has very small wings, but a wild duck is one of the swiftest birds in flight, surpassed only by the wild goose, which is even more heavily handicapped. The whale is a lumberly craft—so to call it—modeled on the lines of a Dutch galliot. Its propellers are exactly the reverse of what we should suppose the correct position, lying horizontally on the water when at rest, instead of being vertical in it, as a vessel's propellers are. Moreover, the flukes of the whale's screw are very small indeed, and are also the reverse of what man makes. They have the least surface at the tip and are largest at the hub—or junction of the body—but a whale goes through the water with this apparatus like a fast steamboat, and can tow a heavy whaleboat full of men at a most surprising velocity for a long time. These instances prove our contention—that we have a good deal to learn yet in the application of power to bodies moving through fluids, either of air or water.

Interesting Gun Experiments.

The Armstrong Gun Company recently showed some very interesting experiments with the latest ordnance. A 6-inch gun was fired four times in 20 seconds, an 8 inch gun three times in 30 seconds. A torpedo was driven satisfactorily with powder. There was a search light which would keep its beam upon an object no matter how violently the vessel rolled. A 10-inch 30-ton gun, when it was fired, opened the breech screw by the recoil and wound up a spring, when released, would close the breech again. A 4-7-10 field howitzer anchored itself after the first discharge by driving a spade-shaped plate into the ground, after which its recoil was met by a jacket which surrounds it. A 6-inch gun, with light portable disappearing mountings, for a siege train, could be taken apart so that no portion weighed more than three tons, ten hours being required to mount it. A 6-inch naval gun fired five rounds in 69 seconds, each time at a different range and target. A plate of special steel designed for a shield received rifle and Gatling-gun fire at 100 yards range without a single penetration, while the plate hitherto used penetrated at every shot, the Gatling gun almost cutting it in two.

New Firebox.

A steel firebox, chiefly for locomotives, to supersede the present expensive copper boxes, has been designed by Herr Bacillek, an Austrian engineer. The corrugated steel plates, raised to a cherry-red heat, are quenched in a bath of a certain composition which has the effect of rendering the metal more capable of resisting the heat of the fire, while the corrugation of the plates not only diminishes the number of stays required, but also increases the amount of heating surface.

Useful Information.

Austria's New Gun.

The military authorities are still extremely reticent concerning the mechanism of the new Austro-Salvator mitrailleuse, or quick-firing machine gun, but a correspondent learns that the firing trials made at the Vienna arsenal have been reported upon as highly satisfactory. The weapon has been adopted by the service, and fully 100 pieces are now ready for distribution. The gun, according to the *London Standard*, is not intended for use in the field, as in the case of the English Maxim and Nordenfeldt machine guns. The new mitrailleuse will be mounted stationary on the outworks encircling important fortresses.

It is only half the weight of the Maxim, and its average rate of discharge is about the same—300 rounds per minute, with a maximum of 320. The diameter of the bore is eight millimeters, being similar to that of the Mannlicher repeating rifle now in use in the Austrian service. The barrel is not incased in a water jacket, and 1200 continuous rounds can be fired before it shows the effects of the excessive heat. The cartridges are supplied, as in the Nordenfeldt, from a large "hopper" fixed above the firing chamber. The gun is fired by means of an ordinary trigger with trigger-grip, and a recoil spring supplies the automatic action.

But the principal point of interest in respect of which the new gun differs entirely from the mechanism of similar weapons now in use in other countries is the oscillating pendulum regulating the speed of fire. There are two firing commands with the Maxim—"single fire" and "continuous fire." The discharge is regulated by the turning of the crank handle. The single fire is as the fire from an ordinary repeating rifle, while the continuous represents the most rapid discharge of which the machine is capable. With the Salvator mitrailleuse, however, the great advantage is gained of sustaining a moderately heavy discharge of 30, 50 to 100 rounds per minute, and increasing it by means of a faster oscillation of the pendulum to 300 when a dangerous phase of the attack has been developed. The saving of ammunition thereby is enormous. The mechanism is said to be very simple, and throughout the trial no jams were recorded. The Austrian military authorities naturally congratulate themselves on the excellence of this new invention.

Making Postage Stamps.

Every part of postage-stamp making is done by hand. The designs are engraved on steel, 200 stamps on a single plate. These plates are inked by two men, and then are printed by a girl and a man on a large hand press. They are dried as fast as printed, and then gummed with a starch paste made from potatoes. This paste is dried by placing the sheets in a steam fanning machine, and then the stamps are subjected to a pressure of 2000 tons in a hydraulic press. Next the sheets are cut so that each one contains 100 stamps, after which the paper between the stamps is perforated, and after being pressed the sheets are filed away. If a single stamp is injured the whole sheet is burned.

Another Ship Canal.

The revival of interest in ship canals has already awakened a deep interest in New Jersey for the building of such a canal across the State, says the *World's Progress*. The canal could be dug through clay and marl from Bordentown to the Raritan, near New Brunswick, a distance of $33\frac{1}{4}$ miles. It would pass for 12 miles along the bed of the Raritan canal, then following the beds of the Stony brook and Laurel brook. It is estimated that it would cost \$25,000,000, and

that it would accommodate ocean steamers of 27 feet draught. This canal would benefit a section of country containing 20,000,000 inhabitants. By its use the voyage around the State of New Jersey to and from New York, a distance of over 180 miles, and all the dangers of ocean storms would be obviated. The trip through the canal, including all lockage, could be made in six hours.

Monkeys Make Pottery and Wine.

An extraordinary story is told by the *London Daily News*, which states that Dr. Macgowan has returned to Tien-tsin, bringing with him, among other curious discoveries, some particulars of a race of Manchurian monkeys inhabiting the mountain region of the great wall of China. They are said to know how to make pottery—more remarkable still, they are represented as having made extraordinary progress in the art of making wine. A recent edition of the official history of Yungking states that lately a large body of immigrating monkeys passed a certain village in crossing from one mountain to another. The boys of the village clapped their hands and shouted at the spectacle, and the monkeys, being frightened, fled, taking their young in their arms, but dropping in their flight a number of earthen vessels, some of which would hold a quart. On opening these the villagers found that they contained two kinds of wine—a pink and a green—that had been made from mountain berries. It is affirmed that the monkeys store this liquor for use in the winter when the water is all frozen. Dr. Macgowan cites other independent testimonials to similar facts, including a Chinese account of monkeys in Chekiang, who pound fruit in stone mortars to make into wine, and he asks: "Is it likely that all these statements are pure inventions?"

Wonderful Canal System of France.

An official document shows that the length of navigable waterways in France is some 8000 miles, of which 650 are returned as tidal, 2100 miles navigable without works, 2250 miles canalized rivers, and 3000 miles of canals, and of this vast network of interior navigation, the government has all but seven per cent in charge, the system having been brought to its present condition at a cost of \$300,000,000 for construction and purchase, and \$25,000,000 for concessions, with an annual cost, also, of \$325 per mile, average, for maintenance. The number of vessels employed on the waterways is about 16,000, and of these 26 per cent have a capacity of 300 tons or more, while more than half of them have a capacity exceeding 100 tons; the number of foreign boats also using the French canals yearly is said to exceed 2000. The motive power is now almost entirely furnished by draught animals, though a few steam tugs are used on the Seine, the Oise and some other rivers, and steam cargo boats are occasionally met. Cable towing and tow locomotives are resorted to a limited extent.

The Electrical Horsewhip.

It seems doubtful, says an exchange, whether objection can be brought against the latest form of horsewhip, which is constructed so as to give a slight electric shock to the animal. The handle, which is made of celluloid, contains a small induction coil and battery, the circuit being closed by means of a spring push. The extremity of the whip consists of two small copper plates insulated from each other, each of which is provided with a tiny point. The plates are connected with the induction coil by means of a couple of fine insulated wires. As a means of surprising a sluggish animal into doing his best work without the infliction of physical pain, the electrical horsewhip will, by many, be hailed with gladness.

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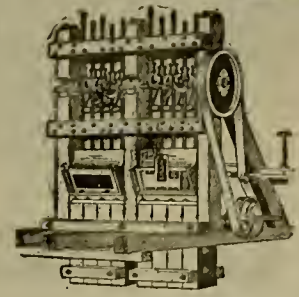
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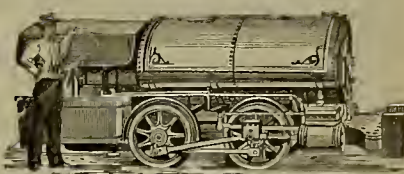
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Electricity.

Electricity in 1900.

The editors of four of the leading authorities, in response to an invitation to give their ideas on the probable development of electricity and its application, promise some wonderful changes before the dawn of the next century. The editor of the *Electrical World* says: "We can expect no great improvement in dynamos and motors, as they now return in electricity as high as 97 per cent of the energy supplied to them. The arc lamp is practically perfect electrically, and, while notable improvements may be made in the present form of the incandescent lamp, nothing startling can be expected. Electric railway traction will undoubtedly supersede all other methods for urban use, and by the extension of networks in the country, promises to largely revolutionize rural life; its application, however, to long trunk lines seems improbable. The electrical transmission of power will receive enormous extensions and probably entirely take the place of steam power within a radius of several hundred miles of water powers and in the vicinity of coal fields, whence the energy of coal will be distributed by means of the electric current instead of the coal itself being transported. The electric light will probably entirely supersede all other kinds of illumination in cities, towns and thickly settled rural districts, and electric motors will gradually enter into all operations requiring power, and more and more narrow the field of the steam engine, if, with the gas engine as an ally, it does not drive it out entirely. Telephoning across the Atlantic is a probability, and seeing by electricity a possibility."

The editor of the *Electrical Review* also believes in the sure advent of the transatlantic telephone, the further development of the transmission of electric power, and especially an elaboration of the domestic use of electricity. On this last point he says: "Electric heating is now an important element in the rapidly extending railway business, replacing the disagreeable and dangerous coal stove, and is advancing into the domain of the coal furnace and gas range, bringing cleanliness, convenience and economy with it. When fully perfected and understood, the electric heater will be one of the greatest boons that the electrical engineer has given us. Every housewife will rise up and call him blessed, and every husband will bless him and not rise up! He can file abed and increase or originate heat in room and kitchen by simply turning a switch or pressing a button. Even this effort may be dispensed with, and a clockwork attachment press the button automatically."

The editor of the *Electrical Age* coincides with this prophetic view of the household run by electricity. This is his view of what we will have by the year 1900: "I expect to see our homes, offices, stores, etc., heated by electricity. This system of heating is entirely practicable, the only question involved being the all-important one, cost. It probably will be made popular by supplying electricity from large central stations through street mains, connecting the premises therewith. Electricity may then be used for cooking and doing what mechanical work may be necessary about the house, store or factory. It can be made to perform all of these duties by simply turning a little handle or pushing a button. Electricity will be used to accomplish a thousand and one different things to save us labor, and in directions little dreamed of at present. New things and applications are being constantly developed; it only needs more popular familiarity with them to find a wider use for them."

The editor of *Electric Power* joins all these and goes even further. Among the items of his prophetic vision are some bits of domestic beatitude like the following

"In 1900 we shall probably have brought down the cost of current and of utensils to such a degree as to allow even people in moderate circumstances to use the cleanly current instead of the coal or gas stove. Then will the millennium of the servant girl have broken into dawn. The overhead or trolley system will very probably be superseded by a system not more obtrusive than the cable on Broadway—a conduit system. The cars running underground will be propelled by electricity."

"In six years we can look for the supersession of the incandescent lamp as it is at present by a new lamp evolved along the lines sketched out by Nikola Tesla, whose brilliant discoveries have recently been fully enumerated by our esteemed confrere, Mr. T. Commerford Martin. The new lamp will probably be without filament, but will glow by the luster of a high-frequency current properly employed. There is even a possibility of the present bulb-shaped lamp disappearing, giving way to a long, continuous tube of glass hidden away behind crevices and casting a soft light upon the ceiling and thence down upon the floor. The disinfection of the city will probably be effected by the agency of electricity. The canal-boats will come down to the wharves propelled by electricity. The streets will perhaps be cleaned by an electrically driven brush, and a mighty exhaust fan in city hall, driven by a motor, may serve to purify it."

Electrical Etching.

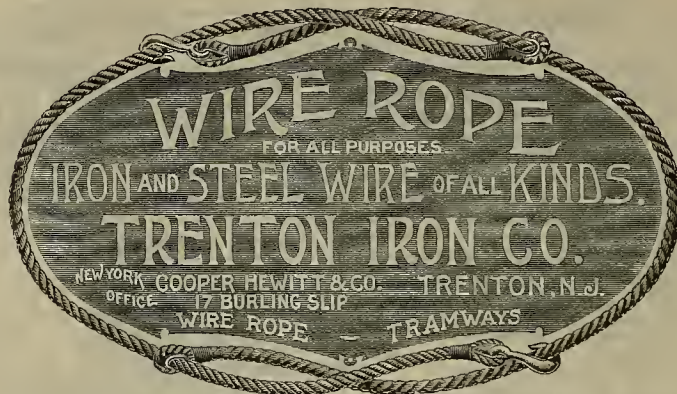
A German technical journal is authority for the statement that electrical etching has advantages over the usual methods, in that the solution need not be nearly as strong, and that when seen under the microscope the etched lines and edges produced by intersections are quiet even and clean cut, while in the usual method they are rough, due probably to the gas bubbles formed, and the lines are apt to be rough, the metal being eaten away below them; the disadvantages are that the current used requires to be regulated, and that the solution must not be too strong. A detailed description is given of how the electrical method is used. Among other things, it states that it is better to use a solution of the salt of the metal of which the plate is made in preference to an acid bath. A good covering material is made of equal parts of asphalt and copal varnish.

The Bell Patents.

The Bell telephone patents which became open to the public by reason of expiration of term on the 30th ult. are: The combination with an electro-magnet of a plate of iron or steel or other material capable of inductive action, which can be thrown into vibration by the movement of surrounding air or by the attraction of a magnet. The formation in an electric telephone of a magnet with a coil upon the end or ends of the magnet nearest the plate. In combination with an electric telephone, the employment of a speaking or hearing tube for conveying sounds to or from the telephone. There are many improvements and attachments to what is commonly known as the "Bell telephone" now in use, which are covered by patents which will not become public property for many years.

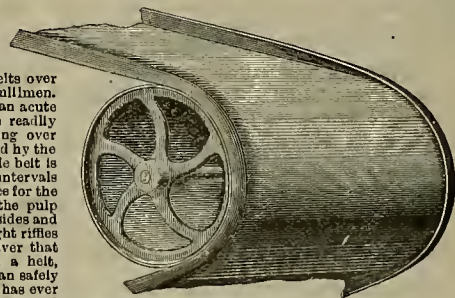
Glass on Wire Netting.

Wire netting has been so coated with glass as to fill up the openings and make a transparent but not brittle roofing and sidewalls. For the glass an insoluble gelatine film has been substituted, and the material, known as "tectorium," is now extensively employed in constructing hothouses, verandas, factory windows and store roofs in several foreign countries. It is tough and flexible, and, if desirable, may be painted any color.



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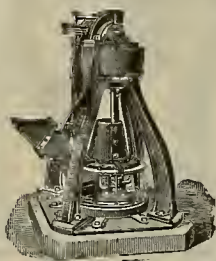
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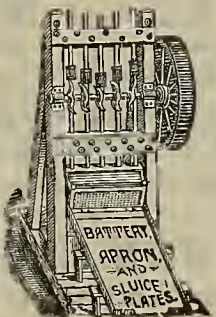
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Mining Summary.

The following is mostly condensed from journals published in the interior, in proximity to the mines mentioned.

CALIFORNIA.

Amador.

AT THE ARGONAUT.—*Dispatch:* Work on the Argonaut mine, south of the Kennedy, is progressing finely. The shaft is now down a depth of 125 feet. They expect to sink down 1200 feet before they commence drifting. The indications thus far give every reason to believe that it will prove to be equally as good as the Kennedy when they reach the proper depth.

THE VETA MADRE.—*Dispatch:* N. A. Brady, one of the promoters of the Veta Mining Company, reports that a considerable portion of the stock set aside for working capital has already been placed, and work will soon be commenced on the property. This property is located on the mother lode, south from the Kennedy and Argonaut mines, being a consolidation of the Schober and Bright properties, and was worked to some extent in early days at which time the rock crushed from \$7 to \$10 per ton. Since then several spasmodic attempts have been made to develop the property, but for want of energy or sufficient capital, have proved ineffectual. Heavy croppings can be traced throughout the entire location, and rich stringers of quartz have been encountered in previous developments.

NEW SHAFT.—*Ledger:* The South Spring Hill Mining Company will commence work in a very short time upon a new shaft which will be sent down 1500 feet. The shaft is to be located a short distance from the old one and where the ledges of the Median and South Spring Hill can be worked with the greatest facility.

MINES OF DAYTOWN.—*Cor. Ledger:* A large amount of capital has been judiciously expended on the group of mines situated partly in the townsite and known as the Drytown Consolidated, comprising the Olive, Bonanza, Crown Point and Yellow Jacket claims. A shaft about 200 feet in depth was sunk on the Olive, and a five-stamp mill erected and some very good rock crushed from near the surface. The funds of the company becoming exhausted and the creditors filing attachments against the property further developments were stopped. A shaft was sunk on the Bonanza claim 540 feet by the Drytown Consolidated Company; one drift was extended northward 120 feet and one crosscut west about 20 feet. For some reason unknown to many of the stockholders, operations suddenly ceased and the mine was allowed to fill with water. Some very good rock was taken from this mine nearer the surface. A 20-stamp mill was erected by the original Bonanza Company.

The Crown Point adjoining, has a shaft 280 ft. which has all caved at the mouth and the machinery removed. Some rock paying as high as \$18 per ton was taken from this claim. A ten-stamp mill was built on the property. Abundance of water in this Yellow Jacket caused this company to abandon their property after extracting some very rich rock about 35 feet from the head of the creek.

This part of the county lies at such an elevation that the main water supply coming from such a height that almost an unlimited power for milling or manufacturing purposes is attainable. Along the ridges which traverse the county from east to west are located the canals of the water companies so that water can be supplied to nearly every acre of ground both in the mineral and agricultural districts, affording sufficient water to run many mines and factories and irrigate thousands of acres of the best lands in the State for the culture of fruit. The character of this part of the county is generally hilly with many small valleys.

Butte.

SHUT DOWN.—*Forbestown New Era:* The Golden Queen mill has shut down pending the opening of a new working level in the mine.

The Gold Bank mill continues to drop its 40 stamps, and the new development work is constantly being carried on. This mine and mill has now over 100 men on its payroll.

The Denver mill is being run to its full capacity day and night and is said to be paying well.

At the Bullion everything is running smoothly, and a night shift was put at work on Monday.

Work at the Beehive (Mt. Hope) mine is being pushed with all possible speed. All the machinery is now on the ground and it is thought that the mill will be completed in about a month.

Leroy Brothers are opening up a quartz ledge near the head of Perkins ravine. The rock carries some free gold and is rich in sulphurets.

Cataveras.

AT THE McFALL.—*Citizen:* The sinking of the McFall mine goes steadily on regardless of bad weather. The rock looks well and without a doubt this will in time be one of the noted mines of this section. The Ford Bros., who have this mine bonded, are energetic men and are sparing nothing to forward the development of this property.

Nevada.

THE MURCHIE.—*Transcript:* Messrs. Bittenbach and Boeckman, two of the directors and leading owners in the Providence mine, who have been here the past few days, visited the old Murchie mine in company with a mining engineer and inspected the property. They represent a company of capitalists who are desirous of buying a gold mine. They will make the owners a cash offer and if it is accepted the new company will proceed to work the prop-

erty. They intend to expend about \$75,000 in putting up machinery and opening the mine. It is believed that with a 100-stamp mill and facilities for handling the ore cheaply, the low-grade rock can be worked profitably. There is one very large ledge in the Murchie mine property from which quartz enough can be taken to keep 100 stamps running for several years, but it will not pay to work it on a small scale.

CEMENTED GRAVEL.—*Transcript:* Sam Peck, Wells Ashman and a man named Peterson, have been prospecting the cemented gravel in the old diggings near Mrs. Storey's residence on Orchard street. Tests made with a hand mortar and pan were very encouraging, but in order to make a practical working test they have had five tons of the gravel hauled to Locklin's mill to be crushed. If the returns are satisfactory they will make arrangements for putting up a mill and working the gravel on a big scale.

THE LUPINE GRAVEL MINE.—*Transcript:* Men have been started to work on day's pay at this mine, which is situated on the Washington ridge, in the vicinity of the Central House and about 10 miles from this city. Some very rich gravel, with occasional nuggets of gold, have been found in the mine at different times, but the main channel has not been struck, although it is believed that they are not far from it. The Lupine is owned by Nevada City and Grass Valley men, among the leading owners being Hon. John Caldwell, F. T. Nilon, Supervisor E. W. Donnelly and George Mainbart.

Mono.

TO START A MILL.—*Bodie Miner:* J. S. Cain is having the Bodie Tunnel mill overhauled and put in shape for working custom ore. It is expected that there will be considerable to do next spring in the way of crushing small lots of ore for different ones.

Placer.

ON FOREST HILL.—*The Auburn Herald* learns that several new mines are being opened on the Forest Hill divide by parties from San Francisco and Eastern States. Among others, the Labaree mine and the Willis mine have recently been sold and are being opened by their purchasers. One of the largest properties, however, which is prosecuting development work is the Eureka Consolidated, a drift mine of great promise, situated above the now famous Mayflower drift mine. The Eureka Company owns nearly seven miles of the channel. It is arranging to use a small Baldwin locomotive or a motor for running its cars in and out of the mine, the same as the celebrated Bald Mountain mine has adopted. The rate the work is going ahead at the Eureka at present it is expected they will reach gravel before the end of the present year.

TO RESUME OPERATIONS.—*Colfax Sentinel:* The Big Oak mine, situated about a mile from Colfax, is soon to resume operations, after being shut down for several years. It is proposed to run the mine by water from the South Yuba Ditch. Owing to the greatly improved facilities that the ditch brings, it is expected that the cost of running the mine will be greatly reduced. Some very rich rock has been taken out of the mine in past years and there is much reason to hope that the same thing may again be expected.

The Hidden Treasure mine at Sunny South paid a bigger dividend last month than any time in its history. The mine has been paying for the past twenty years. About forty-five white men and a hundred Chinamen are employed at the mine.

The company that has bonded the Willis Gould mine at Iowa Hill commenced work on the same this week. Two shifts are at work pushing the tunnel ahead.

The Golden River mine at Red Point is said to have reduced the white miners' wages to \$2.50 per day, and the Chinese miners in proportion.

James Gayetty & Co. will begin operations on their quartz mine at Secrettown in the early spring.

Plumas.

NORTH FORK MINES.—*Cor. National Bulletin:* Messrs. Harper & Long have struck a very rich mine at Cariboo, a few miles below this place. The gravel on the bedrock runs from \$2 to an ounce to the pan. They have just completed a ditch, which will afford them plenty of water for washing the gravel, and when they get things in running order, large returns may be expected.

The company that leased the Sunnyside mine last fall have now got the mine opened in good shape, and last week struck good pay in the main tunnel; and the daily output of gold is now beyond their most sanguine expectations. Some years ago this mine was worked by a company and yielded many thousands of dollars, but it appears the old company lost the pay streak and closed down the mine without prospecting much to find it. The lessees, some old miners here, have always thought it a good property, as there are 160 acres in the claim and scarcely 20 acres yet worked, which from present appearances will pay as well as any of the ground formerly worked and leave a handsome profit to the lucky lessees.

Mr. Hugh Kelly and son have closed down one of their mines for the winter, after a very successful run of about nine months, and are now running a tunnel in another property to tap the Big Flat channel, which is now attracting considerable attention. A claim on that channel is considered a sure paying mine when once opened, as all those who have tapped the channel have found this to be the case. The channel is large and the rime perfect. Of course, the development of the channel has been slow, owing to the fact that it requires tunnels from 300 to 1000 feet to tap the gravel. This work has all been done by poor men.

From actual figures from those who mined the half mile that has been worked, it has produced \$170,000 in gold, the greater part coming from Glazier mine, on the north end, and the Sunnyside on the south.

Mr. Fred Scott has a force of men steadily employed in his mine and is daily adding to the gold products of Plumas. This mine is also on the Big Flat channel. Although it has been open less than a year, it has paid for all the dead work done and left the owner a handsome profit, with virgin ground enough to last for years to come.

Mr. Angus Cameron, who is also the lucky owner of three claims on the same channel, will soon begin to take out gold. He struck the channel some time ago, in an upraise from the tunnel, and has now about completed another raise some distance from the first, which will give him a circulation of air and enable him to work out a large space of ground. Mr. Cameron washed a few carloads of gravel where he struck it, and his returns were \$2 to the carload of 1500 pounds, which, owing to the locality and convenience of working, makes it a good paying property, and one that will last for many years.

Messrs. Bismick and Mullen are doing some work on the Glazier mine, but as they are working down stream they cannot accomplish much. This claim consists of 130 acres, and out of 20 acres that have been washed over \$60,000 in gold has been taken out, but owing to the fact that they have worked the mine down stream below their tunnel as far as the water will permit, the mine is now idle.

Dick White and son have closed down their mine for the winter. They did very well during the last few months. If they had not erred in placing the wing dam on the pay streak they would undoubtedly have taken out a large amount of gold during the last summer. On running a cut under the wing dam the other day, Mr. White got a pan of gravel that yielded \$12, showing how unfortunate he was in placing his wing dam; but he says he will be able to mine it satisfactorily the coming summer, and profit by his experience.

Rachford & Co. are steadily working their claim and taking out considerable gold, with very flattering prospects.

John Leinhardt and Fred Mori have a force of men employed and are taking out considerable gold.

Stephen Dean has found a very good paying claim, and is taking out some money.

Messrs. Mandeville and Rickard are developing their quartz claims, with very encouraging results. They have cut the vein in the "Cub" mine 150 feet deep. The vein is 20 feet wide, and all prospects, and it shows a chute of ore on this mine to be 1000 feet long and 150 feet deep so far; and as the ore will mill between five and six dollars a ton, with all the natural facilities for working which they have, it makes it a valuable property. They are making considerable money with a machine they have invented to save fine gold in working the surface dirt that has broken away from the vein. In a run of 18 hours with it they cleaned up \$10.90, one man handling the dirt, which is very satisfactory to the owners.

This is a good field for miners prospecting for quartz. Very little prospecting in that line has been done, and all the gold found here shows more or less quartz attached to it, thus showing conclusively that it never came far and only needs some good prospectors to prove this a good quartz country.

ELIZABETHTOWN CHANNEL.—*National Bulletin:* Since our last issue, work at the Elizabethtown Channel Shaft has been resumed. The new engine, after being refitted, was placed in position and steam gotten up yesterday morning. The machinery is reported to work perfectly. Sinking is now in progress and, barring accidents, will proceed without interruption until bedrock is reached.

THE '93 MINE.—*National Bulletin:* Geo. McLearn reports much interest taken in the vicinity of Mohawk looking to the development of the mining industry. In the "93 mine," in which he, Mr. Knickrem and others are interested, very good ore has been developed. It is probable that a company will be organized to work the property on a larger scale. Samples of ore sent to San Francisco give a very high assay. An exhibit of the ore will be found at the Midwinter Fair.

Siskiyou.

GOOD WINTER FOR MINING.—*Yreka Journal:* The miners at Hawkinsville are all busily engaged at present in ground-elucidating, and expect to take out a great amount of gold dust this winter, the season being one of the most favorable yet afforded in the way of free water, and plenty of it. The top dirt sluiced off by the flood of water and granite pays very good wages, and the bedrock cleaning next summer is expected to yield immensely.

John Napper, who has a good placer and quartz claim just this side of Joe Piper's blacksmith shop on Humburg, is making preparations for extensive operations in the spring, as there will be an abundance of water to continue work all summer with good success, in consequence of the great amount of snow on the highest peaks of the Humburg range of mountains. Other miners all along the creek are also making similar preparations, and we may anticipate one of the best mining seasons ever experienced on that famous gold-producing stream of both quartz and placer claims.

Martin Schuler, who is engaged in drifting at Scott river, has taken out several fine specimens of coarse gold lately, and expects to take out considerable gold this summer.

Tuolumne.

THE BUCHANAN.—*Independent:* This fine old mine is still being vigorously prospected under the superintendency of Chas. Holland. Stopping from the old adit level is now in progress.

A crushing of 250 tons has just been completed, the result being entirely satisfactory. The sulphurets have a value of \$60 per ton, with a percentage of about 24, and are easily chlorinated and treated. This property is well equipped with a 20-stamp mill, with eight Frue concentrators, and a chlorination and assay office complete.

NEVADA.

Washoe District.

LAST WEEK ON THE COMSTOCK.—*Consolidated California and Virginia mine*—1650 level.—In continuing our prospecting work from the drift run north from the foot of the upraise on the sill floor of this level, we have extracted a few tons of ore of ordinary value. The drift running from east crosscut 1 from the drift north from the winze down 52 feet has been extended six feet; total length, 22 feet; face in porphyry and some quartz. From this north drift at a point 200 feet in from its mouth an east crosscut has been advanced 18 feet, so far in porphyry. Very near this point in working upward we have extracted a few tons of ore assaying \$28 per ton. Total quantity of ore extracted from all parts of the mine during the past week was 56 carloads—about 55 tons; average assay value, \$30.38 per ton. Most of this ore came from our workings in the vicinity of the winze, 20 feet down. The southwest drift, the Rule drift, from the 1000 station of the Consolidated Virginia shaft has been extended during the week 84 feet; total length, 644 feet. At this terminal point an opening has been cut out on the southeast side of the drift and will be continued up to meet the Best & Belcher drift, which is now advanced to within 46 feet of the connecting point, and which, according to the survey, is 40 feet above the sill floor of the Rule drift. Good progress is being made in the work which remains to be done to effect the connection of the two drifts.

Mexican—1465 level.—The crosscut running west from the drift run south from the top of the upraise which was carried up 45 feet above the sill floor of this level at a point 40 feet from the main north drift and 100 feet north from the south line of the mine has been extended during the week 23 feet; total length, 230 feet; face in porphyry carrying clay separations.

Ophir—1465 level.—The drift running north from the crosscut running west from the main drift on the sill floor of this level at a point 124 feet south from the winze station has been extended 18 feet; total length, 142 feet; face in porphyry, clay and a little quartz carrying a small assay value. An advance of 108 feet has been made during the week in reopening and repairing the central tunnel, making the total length of the drift reopened from its mouth 614 feet. Have continued jointly with the Mexican Company the work of making repairs to the main shaft.

Hale & Norcross—1300 level.—We continue stopping out ore from the winze below this level, and extracted during the week 26 cars of ore assaying \$31.13 per ton per car sample, and five cars of ore, average assay per car sample \$17.55 per ton.

Andes—420 level.—West crosscut 3 from north drift extended 13 feet; total length, 23 feet; formation, quartz and porphyry.

BRITISH COLUMBIA.

GETTING RICH BY INCHES.—Away up in the Big Bend country of British Columbia some valuable mining properties have been reported, and, although capital has not been extensively used to operate the ground with labor-saving machinery, a number of hardy miners have been making good wages with primitive tools. The Kootenay Star tells of some of these. Along the Columbia river the benches are being worked. Sol Holden has one near Smith creek, with bedrock to work on. There is water to the amount of 1000 miners' inches turned on the bench by means of a swinging flume, forcing the gravel ahead into a riffled flume, which tails into the Columbia. They have moved about 13,000 yards of dirt in four seasons and cleaned up nearly \$10,000. Had a good six-inch nozzle been working on the bench they could have mined in three weeks what it has taken the present owners four years to move.

On the McCulloch creek summit quartz claims have attracted some attention. One find has been pronounced by experts to be "tellurium," a metal combined with gold and silver in the ore, which is very rich but refractory. It lies in pockets through the white quartz, the pockets varying in value, and with the small amount of development work done so far it is impossible to tell whether they are bonanzas or only a dream. Assays from this ore have gone thousands of dollars to the ton.

The Consolation mine, on French creek, was paying over \$35 a day to the man when last heard from, and, with only four men employed, will take out something like \$20,000 this winter.

The owners of the Selkirk mine have reached pay after years of battling with peculiar geological conditions. At the upper end of the claim there has apparently been a great waterfall. Above this fall the country rock is hard and in position. The formation below is shale, which has fallen from the mountains on both sides and covered up the old channel of the creek to an immense depth. Above the fall the gravel is only two or three feet deep on bedrock. The old-timers of '65 and '66 worked this for about a mile, and, it is estimated, took out gold amounting to considerably over \$1,000,000. Old cabins, rusty tools, rotting sluice-boxes, and such articles used in mining, are there to-day, silent emblems of one time life and busy industry. To reach bedrock below the falls the Selkirk people started down stream about half a mile and drove a straight tunnel against the grade of the creek. When last heard from the tunnel was in 700 feet, and at a depth of over 100 feet they had gone through the shale and were in the top gravel.

on the old channel of the creek. Almost anything is possible when bedrock is reached, and it will create no surprise if they come upon the biggest pockets ever heard of in the history of gold mining.

MONTANA.

THE COPPER COMPANIES.—Bntte *Inter-Mountain*: The Anaconda Company is working the Anaconda, St. Lawrence, Green Mountain, Mountain Con, High Ore and Modoc mines. All the other copper companies are working as usual. The Cressus, Snnyside, Buffalo and Adelaide mines, all Anaconda properties, are being worked under lease. Three sets of leasers are working on the Adelaide. J. R. B. Coon & Co. have a lease there and have struck some good copper ore. The Wappello, Amy & Silversmith, Goldsmith No. 2, Missoula, Murray Fraction, West Elba, Blackbird, Soudan and Eveline are all producing silver ore. Bennett & Clark are getting some rich ore from the Goldsmith No. 2. Wm. Forbis' bonanza Eveline mine is producing richer ore than ever, and the prettiest ore ever seen in the district. Bernard's placers in Missoula gulch are being developed for quartz, and some good ore is being shipped from there.

OREGON.

NEW ORE BONIES.—Baker City *Democrat*: The energetic development work that has been pursued by mine-owners in the Virtne and White Swan districts is hearing fruit. Several of the properties show ore bodies wonderfully rich in gold, and within 60 days there will be such a field opened to capitalists seeking investment that great activity will naturally follow. It is not saying too much when the statement is made that before the close of the present year there will be a dozen or more mines equal to the White Swan in operation on an extensive scale.

FOR HYDRAULIC MINING.—Roseburg *Review*: C. O. White of Tacoma has shipped his extensive plant of mining machinery to Myrtle creek. It is proposed to use it in working the great beds of gravel along the Umpqua river, on the Hadley place, about a mile from town. Mr. White claims to have a process by which he can separate the fine gold from the gravel, and he will put a force of about 60 men at work as soon as his machinery is in place.

Good Nuggets.—Rogue River *Courier*: The Messenger boys have been washing a dry gulch high above the waters of Williams creek during the recent freshets and have 10 nice little nuggets, of an aggregate value of \$150, to show for their work of about 10 days duration. If water could be gotten up there, the boys would soon grow rich, as there is an abundance of just such dirt as they washed during the 10 days' wetness.

STROOK A BONANZA.—Rogue River *Courier*: Enos Mallory has struck a six-foot fissure of gold-bearing quartz in his mine at the top of Old Baldy, six miles southeast of town. The ore assays \$250 to the ton and there is every indication that the ledge is permanent, as it has been tapped by tunnels nearly half a mile apart.

CLEAN-UP.—Jacksonville *Times*: A partial clean-up at the Golden Fleece mine produced a 16-pound piece of amalgam. Operations on the mine are being conducted day and night. Two promising ledges of cinnabar have been unearthed there lately.

Two carloads of machinery, consisting of a quartz mill, concentrator and equipments, have been ordered from the Filston Iron Works of San Francisco for the Mountain Lion mine, and are expected to arrive in a few days.

The S. P. Co. has made a reduction on the freight rate of ore shipped from Ashland to San Francisco. Ore worth under \$50 per ton pays \$5 per ton; under \$100, \$6.60; over \$100 and not exceeding \$300, \$8.60. The ore must be shipped to the Selby smelting works, of which Chas. S. Allmen, assayer for the Ashland Mining Co., through whose efforts the reduction was made, is the agent.

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Cal. Debris Commission Notices.

THE CALIFORNIA DEBRIS COMMISSION having received petitions to mine by the hydraulic process from Daniel W. Albert in the Union mine, near Brownsville, Yuba Co., to deposit tailings behind dam in dry ravine; from Tausteno Camp in the Campo mine, near Brownsville, Yuba Co., to deposit tailings in old hydraulic pit; from J. M. Wetmore in the Herring Ravine mine, near Brownsville, Yuba Co., to deposit tailings behind a dam in a ravine; from W. W. & W. A. Lemmon in the Conduit Ravine mine, near Brownsville, Yuba Co., to deposit tailings behind a dam in the Letson ravine; from James Gordon in the Motor mine, near Brownsville, Yuba Co., to deposit tailings in old hydraulic pit; from Crane Bros. in their mine at Sharon Valley, near Brownsville, Yuba Co., to deposit tailings in old hydraulic pit; from the Spring Gulch Mining Co. in the Spring Gulch mine, near San Andreas, Calaveras Co., to deposit tailings behind dam in Obili gulch; from Joseph Snow et al. in Snow Bros' mine, near Newtown, El Dorado Co., to deposit tailings behind a dam in Webster creek; and from H. B. Havens in the Green Meadow mine, near Glenn, Calaveras Co., to deposit tailings behind dam in dry ravine, gives notice that a meeting will be held at Room No. 92, Flood Building, San Francisco, Cal., March 6th, 1894, at 1:30 P. M.

Assessment Notices.

GOULD & CURRY SILVER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Virginia, Storey County, Nevada.

Notice is hereby given that at a meeting of the Board of Trustees, held on the 31st day of January, 1894, an assessment (No. 73) of Fifty (50) Cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the Secretary, at the office of the Company, Room 69, Nevada Block, No. 309 Montgomery Street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 3rd day of March, 1894, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on THURSDAY, the 23rd day of March, 1894, to pay the delinquent assessment, together with the costs of advertising and expenses of sale. By order of the Board of Trustees.

ALFRED K. DUKBROW, Secretary. Office—Room 69, Nevada Block, No. 309 Montgomery Street, San Francisco, California.

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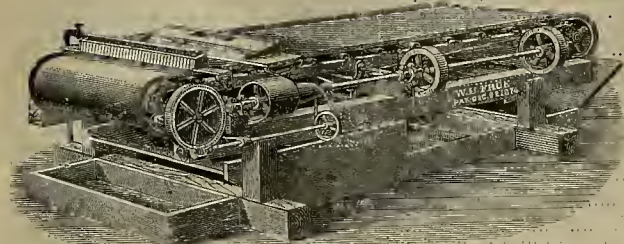
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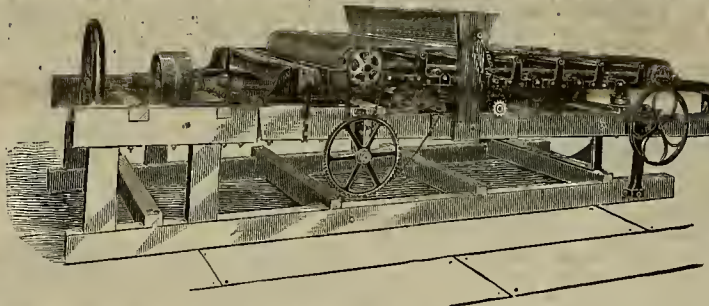
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Number 9.

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Dredge for River Mining

It is a notable fact that California has been unsuccessful in its efforts to secure gold in river beds by dredging. Several methods have been tried, but they have generally failed. It is true that here and there, in places exceptionally favored with very rich gravel, appliances have been devised, with a little success; but these efforts have been crude and not such as to find general or systematic use throughout the State. Several reasons have been ascribed for these failures. One is the presence of howlders and too much rock; another of too much fine sand. These failures are all the more conspicuous because river dredging for gold has been successful elsewhere. In New Zealand and Australia dredging is extensively practiced. One dredge at work in Victoria (Australia) was made in California.

Of late, in the Northwest, a great deal of attention has been devoted to the operation of the Bucyrus steam dredge, made by the Bucyrus Steam Shovel and Dredge Co., South Milwaukee, Wis., which has been in



BUCYRUS STEAM DREDGE IN RIVER MINING.

cylinder 78 inches in diameter, having openings in each end, through which the material is received and discharged. This cylinder is formed by a double screen, with an annular space between them, the inner screen being of heavy steel plate, with coarse holes punched in it, and the outer screen being of fine wire cloth. Of the material dumped into the cylinder, the stones and coarse gravel are retained by the inner screen and ejected by the revolving bucket in the discharge end of the cylinder. The finer gravel is retained by the second screen after passing through the first, and also ejected, while the sand and gold particles sift through both screens into the tank. About one-third of the cylinder, being the part containing the material, is submerged in the tank, and therefore the material is subjected to the most thorough washing and tumbling during its passage through the cylinder. The length of the internal helix is 72 feet, so each particle of gravel is tumbled over that length of coarse screen, during washing. Similarly the finer material is tumbled over 120 feet of screen in the



BUCYRUS STEAM SHOVEL IN RAILWAY WORK.

operation on the Snake and Columbia rivers, it is said, with signal success. The system is elevation of the gravel by a shovel and securing the gold by amalgamation. The dredge (which is shown in the accompanying illustrations)

in its adaptations to river and land work, does not need extended explanation. But the amalgamator does. It consists of a wrought-iron tank, lined with amalgam plates. In one end of the tank is mounted a revolving

outer helix, thus securing more perfect washing and screening than could be accomplished in any other way in a similar space. The construction of the helix and ejecting

(Continued on page 131.)

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San Francisco, March 3, 1894.

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A SAN FRANCISCO PAPER is conducting a popular contest to ascertain which county has the best mineral exhibit at the Midwinter Fair. The trouble with this sort of contest is that it determines nothing, and the county having the finest exhibit may or may not secure the award. The issue depends upon the numbers and energy of the friends of the several counties. If they "rustle," they secure more "coupons" than others. That is all there is to it.

STATE MINERALOGIST CRAWFORD has just stated to the San Francisco Associated Charities that he is unable to give information pertaining to placers in this State that could be worked by the unemployed. In order to make 50 cents or \$1 a day, he said it was necessary for men to understand mining. Much of the placer ground is covered by agricultural patents, and the owners would not permit the surface to be torn up even if the old ditches for conveying water were intact. The bureau had no record of unappropriated or low-grade abandoned shallow placers. This is just about the situation in a nutshell. The agitation for sending the unemployed of the city to the mines has been made by those who misapprehend the conditions. The unemployed would starve to death before they could earn their way, even if they found placer ground from which a few colors might be obtained.

It is interesting to note the epochs in the history of mining and metallurgy in the United States. They are thus placed by Hon. Abram S. Hewitt, in his presidential address, delivered in 1876, before the American Institute of Mining Engineers: First—The building, in 1774, of the first steam engine in America. Second—The rise in gold mining in the Southern States, about 1828. Third—The opening of the anthracite fields, about 1830, and the introduction of anthracite as a blast furnace fuel, in 1839. Fourth—The use of raw bituminous coal in the blast furnace, in 1840. Fifth—The development of copper mining at Lake Superior, in 1845. Sixth—The re-discovery of gold in California, in 1848. Seventh—The commencement of regular production of quicksilver at New Almaden, about 1851. Eighth—The announcement of the Bessemer process, in 1858. Ninth—The development of hydraulic mining, about 1853. Tenth—The rise of Lake Superior iron mining, about 1856. Eleventh—The development of the Comstock lode, in 1859. Twelfth—Advancing in all departments of the iron and steel industry, including the Martin open-hearth process, in 1868. The seventeen years that have elapsed since this historic retrospect have had their red letter days in the calendar of progress, and in future historical delineations will mark the bright points of divergence and advance. It is interesting and suggestive in this geography of progress to note the concurrence of discoveries in promoting the industrial welfare of the nation.

The Silver Situation.

The result of the recent had break in silver prices has been the more complete prostration of the industry, with no immediate prospect of a revival. A number of mines still running in Colorado—the Smuggler, Pontiac, St. Joe, Mineral Farm and others at Aspen, and the Big Amethyst at Creede—have just closed down and canceled all contracts, and it is announced that they will remain closed until the price at least covers the cost of production. The suspension of shipments from these properties will have a disastrous effect upon the smelters, which had made arrangements to put out the fires in one half their roasters and withdraw from the market as unlimited purchasers of gold ore until they can get a supply of fluxing ores. The smelters, since the panic of last July, have lost heavily from the constant depreciation in the value of their stock. The Omaha and Grant smelter is currently reported to have lost \$150,000 from this cause since the time named. Thorough demoralization of the stock market has likewise ensued in Denver; Molly Gibson, for instance, having within a short time gone from \$7 to \$1. Gold stocks have been likewise affected. The Cœur d'Alene mines had already been suspended, and the Leadville are producing ores only for fluxing purposes. The Comstock is doing little. These are given as the leading illustrations of the effects of the broken market. The same conditions prevail pretty generally throughout the silver districts of the United States.

It is a curious thing that, despite the lamentable condition of the silver industry, and of nearly all other branches of business in the United States, Congress is determined to defeat any sort of legislation looking toward the rehabilitation of silver. There is little prospect that the Bland seigniorage bill will pass. It would seem that the country had not suffered severely enough from the results of the recent panic, and has not sufficiently understood the object lesson afforded by paralyzed industry and unemployed and starving labor. Now that silver is down to 60 cents, it will probably have to go down to 50 or 40, and carry wheat and other great staples with it, before the cause of the world's hard times can be appreciated. An effort is being made just now to ascribe the depression to tariff agitation and the Wilson bill. While this is undoubtedly a contributory cause—some of the objections to this measure have been pointed out in these columns—the root of the trouble is the unsettled financial policies of this and other countries. The present industrial depression is world wide; the tariff question is a mere local affair. It is absurd to say that all nations of the world are suffering from hard times because the United States is unable to determine whether its policy shall be a protective tariff or a tariff for revenue only—a distinction, in a broad sense, without a difference, inasmuch as a certain aggregate of revenue must be raised, and it must be raised by levying a tariff. A tariff for revenue is a protective tariff, inasmuch as the methods of levying are precisely the same, and the difference, where it exists, is in degree, not principle. The income tax and the internal revenue are independent questions, of no importance to the world at large.

The talk of international bimetallicism is undoubtedly increasing. Foreign nations very properly ascribe their own industrial troubles to the abasement of silver, and it cannot be doubted that sooner or later genuine effort will be made to restore it to its proper place.

California Mines at the Midwinter Fair.

The California State mining exhibit at the Midwinter Fair is all that was expected; for it is undoubtedly the finest collection of ores, minerals and specimens ever made in the West. The arrangement of the county exhibits is tasteful and convenient, and designed to show their various features to the very best advantage. The location is in the Mechanical Arts building, where nearly 10,000 square feet are occupied on the ground floor. The exhibit yet lacks its finishing touches, and for that reason complete description of its various features, which, with the exhibits of other States and Territories, was intended to be begun in this issue, must be delayed. For instances, the great globe intended to reproduce the exact hulk of the California gold output is yet to be gilded. A fine obelisk, intended to show in similar manner Sierra county's output, is unfinished. Amador county, which is first on the list (alphabetically), is represented only by two pyramids of ore from the Keystone and Kennedy mines. Five carloads of ore, which have been delayed, are daily expected, and then this fine county will be adequately represented. The Trinity county exhibit has been delayed by snows in the mountains, but is expected Monday. Nevada is practically complete, and its aisles are daily thronged with visitors. Butte is rapidly getting into shape, and will have everything in readiness within a very few days. Siskiyou, Shasta and Calaveras

appear to be all ready, but seem to have nobody in charge whose business it shall be to explain their respective merits to visitors. This is a very notable want, and should by all means be supplied.

The exhibit has been opened to visitors for some days. Supt. Benjamin thinks that in about two weeks the last thing will have been done to make it perfect. But, as a matter of fact, it is now ready for visitors, and its deficiencies have been so carefully covered as to scarcely receive notice. That is to say, if all work were suspended to-day (after gilding had been placed on the California globe and Sierra obelisk) a large, attractive and varied exhibit of California's mineral resources would remain. The great marble, sandstone and granite triumphal entrance is in place. The Marshall statue is in position, and the James Lick group of the discovery of gold in California occupies a conspicuous position in the main aisle. The tout ensemble is to-day little short of magnificent. The exhibit deserves to attract, and will attract, a vast amount of attention.

An Oregon Assayer's Troubles.

It is possible that the responsibilities of an assayer to the mining public will be determined in a case just brought in the Oregon courts. W. C. Bruson, an assayer, has been arrested for obtaining money under false pretenses, in that he is alleged to have made false returns of rock given him for determination. The particulars of the charge are interesting enough to give in full.

Bruson was indicted by the Portland grand jury about two weeks ago. The indictment alleges that early in September Bruson was employed by the Big Bonanza Mining Company, a corporation, to assay some quartz. On the 11th of that month, as is alleged, he "feloniously and falsely" represented to the company that certain ore, rock and porphyry formation which had been delivered to him by E. H. Lewis to be assayed, contained a large amount of gold and precious metals, and each ton of rock of similar kind and quality contained 0.42 of an ounce of gold, each ounce being worth \$20.67. The statement of Bruson was accepted as a true and correct report; but the indictment alleges that it was incorrect. The rock and ore examined, and all of a similar quality, contained only a trace of gold, and the assayer's representations were, as alleged, false and fraudulent. By means of these representations, it is claimed, Bruson feloniously obtained from the Big Bonanza Mining Company 2000 shares of its capital stock, each of which was of the value of \$100. The stock was delivered to Bruson when he rendered his report. Bruson has been released on \$1000 cash bail.

It is, of course, impossible to learn now the merits of a case which has not yet come up for trial; but there will probably be some difficulty in making a case against Bruson. The assay as made by him is really quite a modest one, and suggests the inquiry why, when he was lying (if he lied) he did not do a little better. His opportunities were great, and if he had found it to be \$40 rock he might have secured 4000 shares of stock. The outcome of the case will be awaited with interest.

A Great Geographical Congress.

The following self-explanatory notice has been sent out by the Geographical Society of the Pacific to similar associations throughout the world:

SAN FRANCISCO, February 21, 1894.

MR. PRESIDENT:—The Geographical Society of the Pacific has been requested by the management of the California Midwinter International Exposition to designate a day during the exposition, to be known as "Geographical Day," on which a conference of geographers, and of all those interested in geographical science, will be held under the auspices of the society.

It was the general preference of the members to name Geographical Day, March 16th, proximo, this being the thirteenth anniversary of the organization of the society, which was founded in 1881. However, owing to the length of time required for arranging the numerous details of the exposition, it was found impracticable to place the day so early. We have therefore selected May 4th as a suitable date.

We have the honor to invite your learned society to delegate one or more representatives to be present, or to send a paper to be read at the conference on the day named. Delegates will be entitled, and are requested, to make communications, and to take part in the proceedings.

Very respectfully yours,

Committee of Invitation, George Davidson, Pres.; Th. E. Slevin, First Vice-Pres.; John Partridge, Sec.; H. Durhrow, Treas.; T. F. Trenor, Ass't Sec.

Of 329 employes of the Bunker Hill and Sullivan Company at Wardner, only 84 are Americans native born. From a census compiled by the manager of that company it appears that 17 nationalities are represented on the payroll, as follows:

Americans.....	84	Austrians.....	11
Irish.....	76	Norwegians.....	3
Italians.....	27	Frenchmen.....	7
Swedes.....	24	Danes.....	5
Englishmen.....	23	Swiss.....	2
Scotchmen.....	13	Icelanders.....	1
Welshmen.....	14	Spaniards.....	1
Finlanders.....	12	Portuguese.....	1

Dredge for River Mining.

(Continued from page 129.)

buckets is the subject of special improvement, whereby great discharging capacity is secured, and also great strength to withstand the charging of large quantities of material. Amalgamators, as heretofore made, have only been adapted to receive such material as could be fed to them by hand or wheelbarrow. The charge of one ton at a time, twice a minute (this being the capacity of the steam shovel) is a very different thing, and calls for different treatment, and a construction that is solid enough to withstand continuous service under such conditions.

The gold-bearing sand and gravel, after passing through the screens into the tank, tends to settle to the bottom, under the cylinder. It is prevented from doing so by jets of water issuing from small inclined nozzles in the bottom of the tank, which maintain the gold and sand in suspension, and which are so directed as to cast it repeatedly over the amalgam plates with which the tank is lined. Every particle in this way is brought a great number of times in direct contact with the plates, so that none of the gold has a chance to escape. The same jets are so directed as to have the effect of working the sand toward the rear end of the tank, from whence it escapes as tailings, through a suitable valve.

The pressure of water required for these jets is about 20 lbs. per square inch, and the quantity about 600 gallons per minute. By suitable arrangement to drain off the tailings the same water can be used over and over again, only enough of a supply being necessary to make good the losses by seepage and evaporation. The pump to furnish the pressure can be located at any convenient point.

It is proper to say that the amalgamator and dredge are designed for work on land as well as on water. The amalgamator may be placed on a separate car or other movable carriage, beside the dredge and worked in placer deposits. A steam derrick can be carried along with the steam shovel and amalgamator, to remove the tailings.

The larger of the accompanying illustrations shows one of the Bucyrus steam shovels at work in a deep cut, and illustrates the character of material that is sometimes met with. The bank in this case was over 100 ft. high, and consisted of heavy clay and large boulders, and at times it would cave down. The machine was on more than one occasion completely buried, but suffered no material injury. This machine has two cylinders, 8x12 ins., and a dipper of 1½ cu. yds. capacity. The company has manufactured nearly 200 steam shovels, varying in capacity from 200 to 3000 cu. yd. per ten hours.

The Anti-Debris Association Again.

The State Anti-Debris Association issues the following statement to the public:

"During the past six or eight months the hydraulic mines in the mountains have generally been on their good behavior for the apparent reason that they wish to curry favor with the Caminetti Debris Commissioners. But even during that period a few mines operated by Chinese have run in violation of the law and injunctions in such a clandestine manner that it has taken the time of more than one watchman to look after them and keep them in anything like obedience to the law.

"In the mean time many miners have calculated on the cost and feasibility of bringing themselves under the jurisdiction of the Debris Commissioners, and, by the appearance of the repairs they are making, are getting ready to go to work without right or permits from the Commissioners, and bid fair to give us more trouble in the future in the way of violating the injunctions.

"It is further a fact that at least two large hydraulic mines who applied to the Commissioners during the month of December, 1893, for permits, did not wait for the Commissioners to decide their cases, but deliberately went to piping under the claim that they had been granted permits, and this, too, when they knew their claim was false. This fact can be obtained from the records of the Commissioners at any time.

"The Commissioners have decided that they will not undertake to control any hydraulic mine which does not bring itself under their jurisdiction, according to the Caminetti law, and they are still in doubt as to whether it is their business or duty to attempt to punish those who have brought themselves under their jurisdiction by a surrender of their property, etc., but who nevertheless are operating in violation of the law and the injunction of the courts.

"The Debris Commissioners consist virtually of only two men who are physically able to do the field work of examining the works of these mines and looking after them, and their time is so occupied with official duties, as is the time of the entire Commission, that it is unreasonable for anybody to expect them to look after the immense hydraulic mining territory which extends from Shasta county to Calaveras county, and to prevent violations even of their own orders.

"Hence the valley property-owners are left in this condition under the Caminetti law, viz.: Where we had previously got the mines pretty well stopped by injunctions we have now a law which grants them the right to operations provided they comply with the law. That law is to be enforced by four men whose time is already fully occupied and who get no additional compensation for this work, and who cannot, therefore, get out and do the hard labor that is required for looking after these habitual violators of the law.

"Some mines will see that the new law cannot benefit them, and they will proceed to work in violation of the injunction as before,

without fear of molestation from the Debris Commissioners, using Chinamen, perhaps, as a cat paw. Other mines will go through the form of surrendering their rights to the Commissioners, and then without complying with the requirements of the Commissioners in the way of building restraining dams or works will proceed to work when the Commissioners are not looking on. Thus it is seen that the valley is under as great need to-day of a vigilant following up of this mining evil as it has been since the first heavy battles were fought. It may be asked why the United States authorities through the criminal courts do not handle these violators of the law? The answer to that is, that the United States Marshal has not funds at his command to maintain a system of watch over these mines."

This manifesto is worth noticing as testifying to the fact that the Anti-Debris Association is still alive, but that it has lost almost all the vigor and energy which formerly characterized its actions. If miners are operating in violation of the Caminetti act, why does not the Anti-Debris Association appeal to the law as it did in former years with such signal success? Why does it content itself with sitting idly by and inflicting upon the public impotent wallings over the inefficiency of the law and the weakness of the Debris Commission? Does the Anti-Debris Association expect that the Debris Commission will adopt for itself the tactics of espionage enforced in so creditable and honorable a manner for many years by the Association? Or cannot the Anti-Debris Association be trusted longer to protect its own alleged interests and report violations of law as it always has in the past?

As a matter of fact the Anti-Debris Association has exactly the same opportunities and recourse to the courts as it had in former years. It can sue out injunctions as it always could, and it is further supported by heavy penalties imposed by the Caminetti law for violation of its provisions. It is not the business of the Debris Commission to fine and imprison malefactors. That is the duty of the courts, as it has been.

The real trouble is not with the law, but with the facts as alleged by the Association. It is not denied that Chinese and other miners occasionally attempt to hydraulic under cover. They did before the Caminetti law was passed. A few were arrested and punished. Others were not molested. We do not know why. Perhaps the spies of the Anti-Debris Association can tell. The California Miners Association labored earnestly to secure observance of the law, and none regretted these occasional infractions more than its members. But we believe, and the public believes, that the provisions of the Caminetti law are pretty generally respected.

The complaint of the Anti-Debris Association is really an arraignment of the Caminetti law, and the insufficiency of restraining dams. It threshes old straw. Its cause is on the wane and it attempts to revive old prejudices against the miners. It will not succeed.

The Gold Output in South Africa for Five Years.

The following table of the gold output in South Africa during the five years ending with the year 1893 was prepared by Sir Moreton Frewen for the New York Sun. It is altogether probable from the present outlook that during the year 1894 the output will exceed any previous year by many hundreds of thousands of ounces. This statement is based on the fact that a great tract of new territory has been opened, and the mines now operating are much better developed:

MONTH.	Oz. 1889.	Oz. 1890.	Oz. 1891.	Oz. 1892.	Oz. 1893.
January.....	24,985	35,030	53,205	84,550	108,370
February.....	25,630	36,886	50,079	85,819	93,252
March.....	28,076	37,630	52,919	93,244	111,474
April.....	27,131	38,799	58,372	95,582	112,034
May.....	38,938	28,884	54,573	99,436	118,943
June.....	31,272	37,415	55,864	103,252	123,901
July.....	32,407	39,452	54,924	101,280	125,163
August.....	32,142	42,561	59,070	102,222	135,059
September.....	34,369	45,467	55,502	107,852	129,581
October.....	31,914	45,551	72,793	112,767	138,630
November.....	35,115	46,795	73,994	105,795	138,640
December.....	30,215	50,352	60,313	117,749	149,367
Totals.....	381,758	494,859	729,238	1,210,889	1,478,473

Slitkens.

The Mercur mine of Utah paid a dividend of \$25,000 on March 1st.

A Los Angeles drug firm has bonded the Stevens borax mine at Calico for \$50,000.

HAVERV HARRIS, a well-known pioneer and metallurgist, has died at Gold Hill, Nev.

ALL the mines in Grass Valley district are regulated by the standard time of the Western Union Company.

The Omaha Mining Company has declared a dividend of 15 cents per share, which is now payable. The mine continues to look well.

ANOTHER very rich pocket has been struck in one of the Bonanza Company's mines at Harqua Hala, that is said to be richer than anything ever encountered before.

The Standard Mining Company has been organized at Tacoma, Wash. Capital stock, \$5000; 5000 shares of \$1 each. Incorporators—E. F. Cadwell, Starr Sherman and J. H. Ortman.

RICH gold quartz has been taken from the bottom of the must condenser well at Healdsburg, which had been broken in a blast. The well is 200 feet deep, and no water has yet been

obtained. The quartz will assay \$200 to the pound. The strike has caused much excitement. The bore of the well penetrates the gravel deposit along the Russian river.

THE Iron Mountain and Moulton mines of Montana both paid the usual monthly dividends in February. Some silver mines can make money even at the current low prices for that metal.

THE mines in the mountains have been very much hindered in their work by the water. Heavy rains and melting snow have caused the lower workings of many properties to be flooded.

SINCE the Leavenworth, Wash., mining district was organized, no less than 225 placer claims have been located on the Wenatchee river, above and below Leavenworth, and interest increases.

FRANK ZATTONI, formerly in the employ of the Oregon Improvement Company, has commenced suit at Seattle against the company for \$200,000 for injuries received while at work in a coal mine.

THE Coquille Coal Company has been organized at Coquille City, Oregon. Capital stock, \$4000; 160 shares of \$25 each. Directors—A. A. Leach, J. C. Wilson, Will Price, Will Barrows and Albert Wilson.

THE Canyon Creek Placer Mining Company has been organized at Spokane, Wash. Capital stock, \$250,000; 250,000 shares at \$1 each. Incorporators—John F. Wolgamot, Perry Griffith and Frank T. McCullough.

THE New Issue Gold Mining Company has been organized at Seattle, Wash. Capital stock, \$2,000,000; 200,000 shares of \$10 each. Incorporators—L. L. Johnson, Wm. C. Keith, J. A. Helman and Frank B. Ingersoll.

DUEING the past few days several thousand dollars have been taken out of the pocket mines at Sonora belonging to the Obenoweth boys, Terzich and Stewart Miller, and some have been found in several other pocket veins.

THE stockholders of the Minnie Quartz Mining Company will hold a meeting on April 27th to increase the amount of capital stock from \$300,000 to \$600,000. The company has also levied an assessment of one-half cent per share.

FOUR HUNDRED coal miners employed at Lethbridge, Mont., have struck. The cause of the trouble was several reductions in the wages by the company. Serious consequences are liable to follow, as Lethbridge has a population of 1500 dependent on the mines for support.

THE United Verde Co.'s works at Jerome, Ariz., says the Prospector, are making heavy cuts in wages and otherwise curtailing expenses. All surface men have been cut from \$2.50 to \$2.25 per day; machine men in the mine from \$4 to \$3.50; carmen in the mine, \$2.75 to \$2.50. A strike is expected.

PRIVATE telegrams from Washington announce the sudden death of Spruille Baden, a brilliant and successful mining engineer. He was for years United States Assayer at Helena, Mont., and one of the best contemporaneous authorities on silver, gold and copper ores of the Rocky mountain region.

THE Flagstaff Mining Company is the name of the latest incorporated company for Fergusson district, organized under the laws of Nevada. The properties incorporated embrace the Flagstaff, Apex and the Boss locations, on which work has been going on for six months past with flattering results.

THE employees on the day shift at the Union mine, Austin, Nev., all quit work recently. The miners wanted to take only half an hour for dinner and quit at half past five. The foreman said his orders were that the miners take an hour for dinner and quit at six o'clock. The order did not suit the miners.

TWELVE YEARS ago, Richard Hicks of Hills Flat was blasted in a mine, says the Grass Valley Telegraph. At that time a rock lodged in his thigh, which caused him but little pain until very recently. Suddenly it became inflamed and very annoying, and the thigh was cut open by Dr. Jones and the rock taken out. Mr. Hicks never knew that the rock was in his thigh, but now that it is removed he feels much easier.

THE Transvaal mine of South Africa is said to be one of the largest subterranean gold mines in the world. There are 4½ miles of drives underground along the reefs. Three vertical shafts of 400 feet have been sunk, and the fourth, fifth and sixth levels are well developed. The ore is low grade, but there is plenty of it. There are 400,000 tons of ore ready for milling, enough to keep all the stamps in full operation for 12 months.

THE property of the Albany Mining and Milling Company, in the Santiam district, has been sold to Thomas C. Drew, owner of the Hammersly mine, and C. G. Clark for \$140,000. The mine, which is of low grade gold and has been developed since 1860, comprises 13 claims and has 3500 feet of tunneling. The plant will be doubled and chlorination works added. The purchasers say there is enough ore in sight to keep ten stamps running ten years.

THE De Beers Consolidated Mines Company has made another good year's record. For the year ending June 30, 1893, it realized £3,239,389 from the sale of diamonds produced, £99,426 from dividends on investments and £11,717 from miscellaneous sources. It paid £1,695,293 for interest on debentures, etc., and £987,238 in dividends to stockholders, equal to 25 per cent. It could have paid much more. The property on July 1, 1893, was in a better condition than at the beginning of the previous year.

THE largest nugget found in Shasta county in many years was picked up on February 21st by S. Elmore, on his gravel claim near Copley, says the Free Press. The nugget is about five inches long by two and a half inches wide, shaped much like an egg, weighs 30 ounces and is valued at \$520. Mr. Elmore is an old pioneer and miner, and formerly owned the ranch near Elmore, the railroad station named after him. W. W. Williams, the groceryman, has purchased the nugget and will ship it to the mint for coinage.

THERE are at present in the mining districts near Yuma, eight quartz mills having a combined capacity of 150 stamps, says the Times. Thirty stamps are not quite ready to drop and three mills, of 10 stamps each, are idle. The remaining 90 stamps are all running on gold of varying richness. The product will probably average \$100,000 per month. In addition to this, the product of the silver-lead districts is from \$10,000 to \$15,000 per month. The number of men employed in and around the mines and mills is about 500.

One More Reply to Mr. Chapman.

TO THE EDITOR:—In a recent number of your paper appeared an article written by Mr. W. S. Chapman. Will you kindly allow me to give the views of a practical miner in reply? Mr. Chapman's article may be divided into seven heads, viz.: (1) Changes in Mining; (2) What to Do; (3) Sulphurets; (4) Economy; (5) Living; (6) Gambling in Mines; and, (7) Knowledge of Mining.

First, Mr. Chapman advises different management, and, instead of spending from \$50,000 to \$250,000 in a mill, would put from \$400,000 to \$600,000 in a hole in the ground, with its attendant levels, etc. Now, if Mr. Chapman fails to find his mine, what is best? In my opinion, and also the opinion of most miners, the best thing to do is to first sink on your vein, and, as fast as you find sufficient ore to justify a five-stamp mill, put it up; keep on sinking, and, when you can afford it, add five more, etc. When you get down 1000 feet, and you have a mine, sink your double perpendicular shaft and use your old one for air escape, etc. This is legitimate mining; but, if you sink 1000 feet and fail, you have been a victim of chance, and some one is hurt. So much for the first two heads. Now for

Sulphurets.—Mr. Chapman admits that the pioneer miners failed to save sulphurets; and, because evolution has taught us that which they could not know, they are to be blamed. Those very failures made the mines of to-day. Our fathers experimented and we profited by their discoveries. Many miners have failed because they did not know how to reduce the rebellious ore. The mills were all right. They ground the rock as fine and as quickly as we can to-day, but they could not get the dust because they at that time did not know how.

Economy.—Mr. Chapman says: "Mines must be more economically worked than they have been. There is no reason why wages should remain as high as they are. While I am not in favor of reducing workmen's wages as a rule, yet I think it would be far better for the unemployed to work in the mines for \$2 a day than to be seeking work in the park, or around the city, or any place where they may procure work at \$1 a day, and most of the time having nothing to do at all." Hear this philosopher! Mining is a scientific pursuit, and every person is not qualified to mine, any more than every man who can hit a nail is a carpenter or builder. I was born in Tuolumne county in 1857, and have followed mining all my life, and am not ashamed to say that I have much to learn in my chosen profession. It does seem strange that economists on mining every little while attack the profession that is the worst paid (considering the danger) of any. The poor unfortunate miner must risk his life every day; must inhale noxious and poisonous gases; must, in some cases, work under a man who received his mining education in some city—one, perhaps, who would call a piece of old pumpkin flint spar, or who will, with the greatest equanimity, carry a piece of grindstone to the assayer—and, after all this, he is classed with the rabble who must work, poor fellows, for what they can get.

Living.—Mr. Chapman claims that people can live as cheap in California as anywhere. This may be true of the city or large railroad towns, but mines are rarely found in cities. Mr. Chapman himself says that after the prospector has found his mine in the mountains (and I suppose dug his 1000-foot pit) that capital may not come to his relief. As a general thing, the freight on goods costs the miner more than the purchase price in the cities. In summer you can purchase potatoes in San Francisco or Sacramento for 50 cents per sack. The freight from Auburn here is 50 cents per hundred in summer and 90 cents now, a distance of 16 miles. Take Tuolumne, Amador, Nevada, El Dorado, Calaveras and Mariposa, and freight is all the way from 45 cents to \$1 and \$1.25 to the various mining camps. This leaves skill out of the consideration. To equalize things would entitle the miner to more wages than his city brother. But he does not get it. To be a miner a man must spend more time than to become a carpenter, blacksmith or bricklayer. Did you ever hear of these tradesmen working for \$2 a day? That is what they get here. I am informed that the largest mine here, to their shame be it said, have taken advantage of the hard times to cut the wages to \$2; and that, too, in a mine that is supposed to be slowly coming together.

Gambling.—Mining, Mr. Chapman says, is not gambling, and I agree with him this far, that it is not gambling when honestly conducted. Like any other business, it can be made to pay as it goes along. But when you dig long levels and 1500-foot pits (and perhaps fail) it might be classed as chance.

Knowledge.—Mr. Chapman is right. We need knowledge, more knowledge of mining; first, the men who put up the money, and, secondly, you and I. The first thing for capital to do is to employ a practical miner to be superintendent, even if they have to employ a clerk to keep his

books. They will find that he will know whom to employ, and they will also find that their mines will not cave. He may not be able to talk geology and write foolish letters, but can tell gold and silver-bearing ore from grindstone when he sees it. If Mr. Chapman will come up here and pick in the gulches around Georgetown awhile, as I have done all winter, I can assure him, as he eats his beans and hears his bacon sizzle, that he will be gaining something I believe he is much in need of.

JAMES BOGAN.

Georgetown, El Dorado Co., Cal., Feb. 25, 1894.

Mountain Mines—Tuolumne County.

TO THE EDITOR:—The following mines are situated in the Soulsbyville mining district and have all yielded considerable gold in years gone by. Some of them are only worked to shallow depth, and as there is some water in the mines, small pumps and machinery will now be required to open them. The owners have no money.

First is the Soulsby mine owned by Messrs. Sherwood & Leechman. It consists of two claims of 3000 feet in length. It is in granite formation and is now idle. It has been opened by three shafts; the north shaft is 600 or 700 feet in depth, and the south shaft, which is several hundred feet from the north shaft, is 800 or 900 feet in depth and have been connected by drifts. There were several chutes in this mine and the ore taken out was of a high grade. Several millions have already been taken out of the famous Soulsby and there is a large amount of gold yet in the mine. The improvements consist of a 15-stamp mill, hoisting works, etc., which are operated with water power with a fall vertically of about 300 feet. There are also blacksmith shops, boarding house and other necessary buildings connected with the mine.

The Northern Belle mine is to the north of and on the same vein as the last mentioned mine, and has not been opened since it was first worked in early days—and ore taken out at that time yielded \$20 per ton. It has only been worked to shallow depth.

The Mountain Belle mine is still to the north of the last mentioned mine. It has been opened by two shafts, the north shaft 100 feet and the south shaft 80 feet in depth. Both shafts are connected by drifts. Ore from this mine when last worked yielded \$70 per ton. The sulphurets are of a high grade and there is a good percentage of them.

The Tuolumne, which was discovered and first worked in the early sixties, is thought to be a good property. All ore has been stoped out about 75 feet in depth and was of a very high grade. The sulphurets were not saved but the assay value was \$300 and upward per ton. The vein in the bottom of the shaft is of a small size but the last ore taken out paid \$125 per ton in free gold. The size of the vein runs from 6 to 18 inches in width, granite formation. Pump and hoist will now be required to open this mine, and by sinking the shaft no doubt large bodies of high grade ore will be opened up.

An old ancient river or channel runs near Soulsbyville. A shaft has been sunk to the depth of 90 feet, which was to the north of the main channel. A drift was started, but as the owners had no capital they had to close down before the channel was reached. They had small prospects and are now fully convinced that it is a large channel, and no doubt contains a great quantity of gold. It can be traced for miles and can be fully prospected for a few hundred dollars. Good water power can be had and free water during the winter months. We hope this property will soon be opened, and when it is, it will make busy times in this section of the country, as we are fully convinced that there are large quantities of gold in this channel.

MINER.

A Steam Hydraulic Plant.

TO THE EDITOR:—Yesterday was a gala day for the people of this place. It was the occasion of the breaking ground, so to speak, of the mammoth steam hydraulic mining plant that has been placed on the Hadley bar, two miles below town. This plant has been in course of construction for over a month, and yesterday steam was gotten up and the water turned on the gravel with a force that made the boulders dance like fairies.

This bar lies along the South Umpqua river and was first worked in the early fifties, a little over an ounce of dust being taken out by three men in one day by the old process of wheeling the dirt and washing it in one sluice box. But owing to the lightness of the gold (thin scales) the old process cannot be used except during extreme low water, when there are a few spots that can be profitably worked in this manner. This bar has been prospected by numerous parties at various times, nearly every one of whom pronounced the bar very rich and likely to be good property, provided a process could be used that would successfully save the gold. About a year ago Mr. Coburn, an old forty-niner, came to this section of country, and, after thor-

oughly prospecting this bar, became convinced that it could be successfully worked by means of a steam hydraulic plant, and what he terms the "burlap process." The general contour of the ground and the fall in the river made it impractical to attempt taking out a ditch for this purpose. He then proceeded to lay his plans before White & Co. of Tacoma, Wash. These gentlemen, after an examination of the ground, proceeded to buy up all the land on which this bar was deposited, and also to locate a number of claims. They then procured a 150-horse-power boiler and a No. 15 Gardner steam pump, having a maximum capacity of nearly 100,000 gallons per hour, with a 10-inch suction and an 8-inch delivery pipe. This pump has been warranted to throw a cutting stream 100 feet through a 2½-inch nozzle.

The machinery all started off smoothly, and the only thing remaining now is to await the result of the first clean-up, and then we will see how the "burlap" process works. If it saves the gold successfully there will be half a dozen similar plants put in operation during the year, for there are thousands of acres along the river equally as good if not better than the Hadley bar.

W. T. FOGLE.

Myrtle Creek, Or., Feb. 26, 1894.

To Make Non-Flowing Wells Flow.



The Chapman Patent Process is designed to cause non-flowing wells to flow without pumping. Its claims are as follows: It will deliver from two to five times more water than can be pumped, and is more economical than any other means of raising large quantities of water. No well is too small, too deep, too large, the water too muddy or too sandy for the use of this invention.

We here illustrate a new principle of causing artesian wells to flow. It consists of placing an air pipe connected with an air compressor a suitable distance down into the well, with an ejector placed on the lower end of the air pipe and a separator on the top. The air is forced down into the well and expands upward out of the ejector with great velocity, carrying the water with its force and expansion. The air being so much lighter than the water, the difference in their gravity assists to cause the water to flow over the top of the well with great velocity. It will throw out sand and gravel without injury to the machinery, and when there are obnoxious gases in the well, such as sulphurous hydrogen or other gases that will mix with the air, they will leave the water in the separator; and when the air is cool at the compressor, before being forced down, the air as it expands will absorb the heat in the water and make it much cooler and more potable. It is suitable for irrigation, water works, ice plants, breweries and all places where large quantities of water are required. The manufacturers guarantee this invention to give satisfaction, or ask no pay for the erection of the plant.

Further information will be furnished by addressing the American Well Works, Anrora, Ill., Chicago, Ill., or Dallas, Tex.

THE profits of the Alaska-Treadwell mine for the six months ending Nov. 30, 1893, were \$283,179.23. The above sum of \$283,179.23 does not include store profits for the period. Allowing usual rate of income from this source, the profit made for the six months, and available for distribution, has been say \$288,000; the regular dividends have absorbed \$150,000, thus leaving \$138,000 surplus on account of the bonus dividend to be declared in May, 1894. The bullion output and net profit have both been higher than for any previous half year in the history of the mine; while the total costs of \$1.25 per ton (less than 1½ dwts.) have been lower than ever before. The ratio of net cash profit to bullion output, therefore, shows the very satisfactory figure of 66 per cent. The Treadwell mine to Nov. 30, 1893, has produced \$3,838,076.30 of gold, with a net profit of \$2,528,802.85.

THERE is good authority for the statement that the Senate committee on the tariff bill has decided on a small duty on lead ore and coal, and that iron will remain free as in the House bill. Sugar still hangs in the balance, the prevailing opinion being that a compromise duty of three-quarters of a cent per pound will be reported.

THE CLAYTON AIR COMPRESSOR WORKS have removed their offices and salesrooms to the second floor of the Havemeyer Building, 26 Cortlandt St., New York, retaining their former store as a warehouse. We wish the Clayton Works every success in their new and commodious quarters, and trust the volume of their business may even exceed that of former years.

Limitations of the Gold Stamp Mill.

Discussion by Phillip Argall, of Denver, Col., on paper read by T. A. Rickard before the International Engineering Congress.

The limitations of the gold stamp mill resolve themselves (according to Mr. Rickard) into the slow speed, long drop and high discharge, represented by the Gilpin county practice on the one side, and the fast speed, short drop and low discharge represented by the California practice on the other; while in the contrast between these systems he illustrates the very elementary axiom "that the treatment must be suited to the character of the ore." On this latter point, at least, we can all agree.

The high discharge is invariably used where fine crush-log is desirable, or where stamping and pulverizing in one operation are necessary for the liberation of the fine gold. This practice is not by any means limited to Gilpin county or to any recent dates. As early as 1868 mills were running in Victoria, Australia, with drops of 18, 16 and 15 inches, the number of drops varying from 35 per minute upward, and the weight of the stamp from 300 to 900 pounds.

At the Morro Velho mine, Brazil, the high discharge has long been used in the treatment of pyritic ores. Some carefully conducted experiments with high and low discharge at this mine are given by Mr. J. A. Phillips, and are well worth quoting:

"With a 6-inch discharge, 75 per cent of the stamped ore passed through a 120-mesh screen, and the loss in gold amounted to 44.70 per cent, while with a 20-inch discharge, 87.5 per cent passed through a 120-mesh screen, the gold loss being only 30.96 per cent. In other words, the high discharge reduced the material retained on a 120-mesh screen 15½ per cent, and thereby increased the gold saving 13¾ per cent.

It is a well-established rule that fast speed, short drop, low discharge and heavy stamps are to be used for coarse crushing, while for fine crushing, slow speed, long drop, high discharge and light stamps are in order. The point at which fine stamping should cease, and from which the further pulverization of the ores should be conducted in Chilian or Hungarian mills, arrastras or similar pulverizers, is not, however, very clearly defined.

The stamp is a very inefficient pulverizer, at best, and were it possible to get on the die at any one time all the fine particles requiring further reduction, the philosophy of lifting a 500-pound stamp 20 inches to crush these minute particles of ore is not very apparent. Mr. Rickard claims that the turning of the shoe causes the abrasion of the surface of the gold, etc. This action is, I believe, so insignificant in the stamp battery as to be almost unworthy of notice; and hence, when the grinding or abrading action is necessary to prepare the gold for amalgamation, resort is usually had to arrastras and similar grinding machines. This has been well illustrated at the Pestarina mine, Italy, where the best possible extraction with stamps did not exceed 65 per cent, while arrastras, in the form of the Frankfort mill, gave an extraction of 82 per cent. The ores were principally iron pyrites, carrying the gold in minute particles, more or less infilled in micaceous schist. Not only fine grinding, but also time and attrition, were found necessary for successful amalgamation.

Among the advantages claimed for the Gilpin county mills, we find the following:

(1.) "The deep discharge causes the pyrites to remain in the mortar long after it has been pulverized to a size smaller than the screen openings." Now, it is manifest that if the pyrites remained longer in the mortar than the other portions of the ores, the mortars would eventually be filled with pyrites to the depth of the feed used. This condition of affairs is not found to occur in practice. As I understand it, all the ores are retained longer in a deep mortar than in a shallow one; they are, therefore, crushed finer, and consequently the friable ores are reduced to an extremely fine state of division, and in great part converted into slime.

(2.) "The long drop gives the interval of time required to allow the settling of the fine gold." The coarse gold, in all probability, settles in the mortar and is amalgamated; the fine gold, however, would be thrown upward by the splash, and caught in part on the copper plates, and in part discharged through the screens.

(3.) "The roomy character of the mortar aids the deep discharge in affording a chance for the gold to get out of the way of the falling stamp, and to become amalgamated on the copper plates." It is difficult to comprehend how the roomy character of the mortar or the deep discharge can either jointly or severally afford a chance for the gold to "get out of the way" of the falling stamp, unless on the hypothesis that the gold is endowed with the potentiality of locomotion.

Mr. Rickard believes that the hammering which gold receives in a stamp-battery prevents amalgamation.

Professor Egleston says that hammering gold on a

smooth anvil with a clean, smooth hammer prevented amalgamation; and he has further proved that hammering gold in a clean mortar, under water, also prevented amalgamation. It is important to note that, in both examples, gold was hammered between smooth iron surfaces, an action that never occurs in a stamp battery, in which the gold, if hammered at all, receives the pounding between rough and gritty ore, or, at most, against but one iron surface, the result being the roughening and cutting of the gold flakes and particles, thus presenting new and clean surfaces to the mercury and assisting the amalgamation.

Indeed, Prof. Egleston's experiments confirm this view, for he found that when a freshly broken edge of the gold plates came in contact with mercury, in every case it amalgamated at once. I have never found hammered unamalgamated gold in stamp-mill mortars where mercury was used, nor have I ever found a millman who has noticed such an occurrence. I am therefore warranted in the conclusion that the hammering (?) which gold receives in a stamp battery does not prevent amalgamation. On the contrary, I think it has a beneficial effect on that process.

We are told that the metallic sulphides commonly occurring in gold ores will be found, after stamping, in thin flakes and plates which readily float upon a running stream. These sulphides are iron, copper and arsenical pyrites, zincblende and galena, and I am not aware that they ever break up into plates and flakes under the conditions named; they are, however, carried in a slingshot stream, floating, as it were, but simply on account of their excessive fineness.

The action claimed for the air in floating the slime in a mortar is, I presume, applicable to the California as well as to the Gilpin county mortar, if, indeed, it has any application at all. Now, the only way that air can reduce the specific gravity of finely crushed ore is by adhering in a fine film to the surface of the particles; and as the ore is wet from the moment it is put into the battery (and usually before it is put in) no air-film can form around the particles; therefore it is highly improbable that air gives the result claimed for it. As regards the heating of the water and air in a mortar, it must, under ordinary working conditions, be infinitesimal, probably not one-tenth degree F. Of the many so-called contradictory features discovered in the stamp-mill, I will note but one:

The vibration set up by the falling stamps is said to crystallize the work of the mill and assist the work of gravity on the tables. I can see nothing extraordinary in this. Vibration, under all conditions, will crystallize iron, and whatever good effect the vibration of the mill framework may have on the tables, it is not the same effect as the action of a jig.

The principal reason why the Gilpin county mill crushes less than the California is that it does more work because it crushes finer, and that, as the agitation of the water is less, the ore is not discharged so freely. The loss in efficiency due to the greater depth of water is caused only by the resistance of the stamp in passing through it, and not to the loss of weight, for this latter is the same when it is lifted as when it falls.

Pause, during which the particles can settle, is counted by Mr. Rickard as the time between the successive drops of each stamp, that is $\frac{60}{30} = 2$ seconds, but there is, in a 5-stamp set, a drop every $\frac{60}{5 \times 30} = 0.4$ seconds; consequently the water in the mortar is agitated by 150 drops per minute; the only real pause at each stamp is the fraction of a second that it rests on the ore.

In comparing the amount of water used, it should be calculated per ton of material crushed. On this basis there is no difference between the Australian and Colorado stamps; the former crushes 2½ tons with 5 gallons, the Colorado 1 ton with 2 gallons.

The greatest defect in the stamp-mill as a crushing machine is in the discharge. The ore, even with a double issue, cannot escape from the mortars as fast as it is reduced to a fineness corresponding to the screen openings, and it is consequently slim. Particularly is this the case with pyrites and other heavy and friable minerals. This defect is augmented by the high discharge used in the Gilpin county mills, and is claimed by Mr. Rickard to be made "an assistant to the millman." Now, if the greater part of the value were extracted from the pyrites, so that the tailings from the mills might run to waste, this practice would undoubtedly be the correct one to pursue; but, inasmuch as the tailings are invariably concentrated, with a view to extract this very pyrite already reduced, in great part, to extremely fine slime, it is self-evident that "the millman's assistant" in the first operation becomes his adversary in the second.

There is always a danger in comparisons and generalizations. I therefore prefer discussing specifically milling

under the conditions that obtain in Gilpin county, and to this end it is obvious that one must take the whole process into consideration. Gilpin county milling is, in brief, fine stamping and amalgamating (very fully and clearly described in Mr. Rickard's paper), followed by concentration and smelting of the concentrated product. My experience is but that of an occasional customer of the mill. As such I find the saving by amalgamation does not exceed 60 per cent on average ores; and I freely admit that this is a good saving from ores carrying their principal values in pyrites. This statement of saving is confirmed by carload lots that have been sampled at public samplers and afterward shipped to the mills for treatment, the complete returns of which I have had the privilege of examining, from time to time, as the tests were made. On straight iron pyrites, however, the saving by amalgamation in Gilpin county mills will not exceed 35 per cent of the gold, as the following tests will show.

For the purpose of testing the extraction that could be made from pyrites, I had a carefully sorted lot of 11 tons put through a sampling mill, with the result that it assayed, gold, 1.06 ounces; silver, 1.74 ounces per ton. The ore was then shipped to one of the best mills in Black Hawk, Gilpin county, and the following result was obtained:

	Weight, ounces.	Percentage saved.
Gold saved.....	4.03	34.99
By amalgamation.....	1.52	13.04
In blanket tailings.....	1.36	27.10
In concentrates.....	8.76	75.13
Totals.....	8.76	75.13
Silver saved.....	1.14	6.0
By amalgamation.....	1.52	7.9
In blanket tailings.....	7.14	37.3
In concentrates.....	9.80	61.2
Totals.....	9.80	61.2
Weight of blanket tailings.....	416 Pounds.	Gold, ozs. 7.30
Weight of concentrates.....	10,100 containing	62 Silver, ozs. 1.40
Totals.....	10,616	7.92 8.70

The gold might be described as fairly coarse. A few colors could be obtained from almost every panning. The amount of gangue in the pyrites was about 5 per cent, leaving, say, 10.45 tons of pure straight pyrites. It will be noted, however, that about 50 per cent of this was lost in the tailings, together with 25 per cent of the gold and 49 per cent of the silver, while the 50 per cent saved as concentrates contained 40 per cent of the entire gold and 45 per cent of the silver in the original ore. The concentration of the tailings in the Gilpin county mills is conducted on end-percussion tables (hump-tables). Now, as we have seen that much of the pyrites is reduced to slime in the mortars, the loss in concentration is necessarily heavy. It varies, perhaps, from 25 to 50 per cent of the pyrites contained in the ore. Some of the Gilpin county gold ores contain a fair amount of silver, the greater part of which is lost in the milling process.

The concentrates produced from the Gilpin county mills find a ready market at the Denver smelters, where the gold and silver are paid for at market rates, less five per cent, with a very moderate working charge, varying from \$4 to \$5 per ton.

It will be seen that, as the pyrites in the tailings are invariably concentrated and sold to the smelters, there is no gain in taking out part of its contained gold by amalgamation, more especially as in doing so the ore is reduced to such a fine state of division that considerable loss is entailed in the subsequent process, a loss that far exceeds any advantage derived from extracting part of the gold in the mortars and receiving the full market price for the gold so extracted. It appears, therefore, that concentration before amalgamation is the correct method to pursue in dealing with the average Gilpin county ores; and, in this connection, it is worth noting that this method is pursued in dealing with the very coarse ores from which the more or less solid sulphides are invariably picked out by hand and shipped direct to the smelters. It goes without saying that if the principle is correct in the one case it must be in the other; and if concentration by hand is applicable to pieces of ore from, say one-inch cube upward, mechanical concentration is equally applicable to the finer portion of the ore, as also to the fixed ores that require crushing preparatory to concentration.

I am fully aware that, in advancing the doctrine of concentration before amalgamation, I am going over old ground; nevertheless, I hold that it is the correct method to pursue, and, as such, cannot be set aside on account of the failure of previous crude tests, which were faulty in execution and incorrect in principle. Smelting is a very important step in the treatment of Gilpin county ores; without it the present system of milling would cut but a sorry figure in the metallurgy of the West.

The full importance of smelting does not appear to be thoroughly understood by the mill-owners, and it is not to be wondered at that the full advantage to be derived from concentrating and smelting is neither admitted or practiced.

Quartz Belt of Butte County.

Abridged from article in Oroville Register.

The quartz belt of Butte county is attracting more attention than ever before in the history of this State. The mining developments have been rapid and of great extent during the past two years, and some details concerning the veins of gold found in this county may be of general interest.

Two-thirds of the 1,200,000 acres of Butte lie in the foothills and mountains, and these hills and mountains are seamed with veins of gold-bearing quartz, which in by-gone times fed the hundreds of rich placer mines that made this county famous in the days of pioneer mining. In addition to the number of veins being worked at present, there are many others which are being prospected, and thousands of additional ones on land owned by the Government or by the Southern Pacific Company. These will some day be prospected, developed and worked, for gold-bearing quartz will be mined and milled in California when more years will have elapsed than the number passed since America was discovered. At an early day in this county, quartz veins containing gold attracted the attention of miners, and a few small mills were erected; but owing to the high price of freight, machinery, supplies and labor, it took rock that was exceedingly rich to pay expenses. Amid the foothills of the county there are hundreds of old tunnels that were run on ledges where the miners hoped to strike rich pockets, as ordinary quartz could not afford to be crushed.

After the first great rush of mining was over, quartz mining declined in Butte and did not revive until within a few years, when much prospecting was done, many mills erected and hundreds of thousands of dollars were invested in mining property. Many things contributed to the rapid extension of quartz mining during the past few years. In the earlier or primitive mining the ledges that were sulphuretted were avoided, as the miners did not have appliances to successfully work the ore. This class of lodes is more numerous in Butte than those containing free gold only, so that at present the ledges are in demand that in former years were passed by, for the lodes that are heavily sulphuretted are those which pay best for working. Under the present methods, there is but little trouble in saving a large percentage of the gold, whereas in earlier times much of the gold was lost. In a single ravine, old miners point out tallings that it is said contained \$200,000 worth of gold that was lost owing to a lack of facilities in saving the light or floating gold which passed through the concentrators.

While there are numerous mills in Butte county crushing ore, and many lodes being prospected, yet we consider quartz mining in the county only in its infancy, for so numerous are quartz ledges that we doubt if a single section of mountain land about Forbestown, Hurlston, Bangor, Wyandotte, Enterprise, Lumpkin, Oregon City, Nimshew, Magalla, Lovelock, Inskip, Cherokee or Deadwood can be found without one or more lodes containing gold.

Three hundred and fifty Ledges.—The quartz belt of Butte begins in the foothills at an altitude of about 500 feet and extends to the top of the highest mountains fully 6000 feet high. Among the lodes in the low foothills are the Mascot, Standard and Banner. From the latter \$600,000 was taken out in a short time. These are near Oregon gulch and Oregon City. Close to Oroville are two lodes being developed by G. M. Sparks and G. Strang and by Miller, Ordway & Co. There are several ledges near Wyandotte and others near Bangor. One there is owned by Gardner Osgood and another by Parks & English. So rich is the latter lode that this winter, while working the rock, the men were armed with Winchester rifles and no one was allowed to come near unless his name and business were known to the owners.

The region about Hurlston where the altitude is from 1500 to 1800 feet, is ribbed and seamed with veins of quartz which are rich in gold. Here the Phoenix, Pactolian, Stow or Dutch Ravine, Hurlston and Chevalier ledges are being developed, together with many others that are being prospected. W. W. McMillian, Jr., who is recognized as one of the best prospectors in the county, estimates that there are not less than 250 lodes within a few miles of Hurlston which in time will prove profitable. Capital is needed to open and prospect these, to ascertain their extent and to place mills where the rock can be worked in a cheap and in an economical manner. The locality known as Enterprise, on the South Fork of Feather river, contains numerous good ledges. Some of these, as the Oro and E. W., have been successfully and profitably worked, and others are now being opened. Near here is one of the grandest ledges in the State. It is owned by Jas. Carlisle, but for several years has been in litigation. The ledge is very wide and can be traced for a long distance. Miners who have lived long in the locality believe there are not less than 50 ledges near that will pay to work. To these we may add the same number for Bangor, making for the

three localities no less than 350 ledges. It is about 12 miles from Enterprise to Bangor, and the whole mass of hills appear to be crossed and recrossed with veins of gold-bearing quartz.

Richest District in Butte.—The section named above is, however, only the lower edge of a vast quartz belt which extends up to Forbestown and Mt. Hope, and this is known to be the richest quartz belt of the county.

The mass of mineral about Forbestown is the largest and richest so far opened in the county, and the developments now made warrant the assertion that Forbestown will be a thriving and populous mining town for many years to come. The Goldbank, Shakespeare, Golden Queen, Denver, Bullion, Mount Hope and other mines and mills in this vicinity have a large number of men employed. The reduction works of the Shakespeare and Goldbank mills are the largest in northern California, and several new devices have been introduced for the purpose of saving all the gold in the quartz. It is entirely within bounds to say that within a few miles of Forbestown not less than 100 quartz lodes have been located and some work done to develop them.

Another Rich Locality.—Oregon City, Oregon gulch and Morris ravine, all within a few miles of each other and within seven or eight miles of Oroville, are rich in gold-bearing quartz. Here are located the Banner, Mascot and Standard quartz mills and here many ledges have been prospected. In early times there were some extremely rich ledges worked here, and now several of these are being reopened. County Surveyor McCoy, who has been carefully over the ground many times, estimates that in the township there are not less than 75 lodes that will prove valuable for mining.

He estimates the same number in the township in which Yankee Hill and Deadwood are situated, and in which are situated the Rainbow, Wellington, Eagle Point, Jordan Hill, Paxton, Porter, Brnwell, North, Christie and 14 claims located by W. T. Coleman. The townships together he estimates to contain 150 gold-bearing veins that will pay to work. Now if to these we add the 100 at Forbestown, 150 at Enterprise and Bangor and 250 about Hurlston, we have 650 ledges that competent men estimate will some day be worked for the gold they contain. There are many other parts of the county rich in quartz, namely, Lumpkin, Brush Creek, Lovelock, Magalla and Inskip, and all these contain good paying lodes. The western line of the extensive quartz belt in Butte is considered to be Butte creek, but there are excellent lodes west of that stream. C. W. Russell, a miner of many years experience, says the region about Inskip and Lovelock is seamed with gold-bearing veins which in the future will prove a source of immense wealth. Capital is needed in Butte to develop many of the mines, as it is but a few years since quartz-mining began here on an extended scale, and the county suffers from a lack of capital to open some of the best mines it contains.

Opportunities.—There are many opportunities here for those desiring to invest mining capital or who seek to secure valuable deposits. Of the thousand gold-bearing veins in the county, not 100 have been mined. There are thousands of acres owned by the Government and by the railroad company that can be purchased for nominal figures, and these lands in many instances are rich in quartz. This country lies upon the western slope of the Sierras where the climate is not severe and where water and wood are abundant. There are hundreds of streams from which water can be easily obtained for cheaply working arrastras or stamps. Snow does not fall deeply until you reach an altitude of 4000 feet, and it therefore rarely interferes with mining. The hundreds of creeks and canyons of this county were among the richest in California and the gold originally came from quartz ledges.

The Snow Sheds.

During the last storm snow fell as far west as Auburn, Cal., which is something unusual, says the Winnemucca *Silver State*. At Towle's station, east of Alta, there was a fall of fifteen inches. On the summit six feet were piled up, which makes the total depth about fourteen feet. The snow galleries along the line of the Central Pacific are completely shut out from daylight for several miles west of the summit of the Sierra range, and without them there would be no possibility of keeping the line clear for travel with the present depth.

These galleries cover the track the entire length of the snow belt—a distance of forty-five miles, extending in an almost unbroken line from a short distance west of Truckee to Shady Run station, four miles east of Alta. A pine forest, with an area of over ten square miles, was felled to furnish timber for their construction.

The cost per mile of these structures was \$46,000, except across the summit, where three miles of the galleries cost \$96,000 per mile. These galleries are built of huge timbers

bolted to the granite rocks, and are of a strength sufficient to withstand the shock of the avalanches that sweep over them when the snow begins melting in the spring. In descent to the bottom of the deep ravines below these avalanches sweep everything in their path, lofty pines that have withstood the storms of centuries being carried along with the moving mass. When the project of erecting these snow galleries was first suggested it was declared impracticable, but without them traffic would be suspended nearly every winter over that part of the snow belt protected by them.

The Coolgardie Fields.

As our knowledge of the gold fields of West Australia accumulates, it is very evident that impressions and opinions formed a few months ago must submit to modification, says the Australian *Mining Standard*. The glowing and exaggerated reports received from Coolgardie, for instance, in the throes of the excitement attendant upon the discovery of Bayley's, in the light of later information will not hold water, nor are they any longer viewed with reliance. At the same time, it must be admitted on all hands that Coolgardie and the Murchison are remarkably rich auriferous areas, the like of which was before unknown in Australia; and which, if developed with calm judgment, and the constant idea that mining is an industry and not a speculative pursuit, will largely assist in the year just entered upon to disperse the clouds of depression. The West Australian Government are evidently becoming daily more alive to the opportunities before them, and to the welfare of the hundreds of individuals who are flocking to their territory from the remotest corners of Australia. Their past inaction, however, is to be regretted. How much more would the comfort of those journeylog over the tracks from Southern Cross have been secured, to say nothing of the wider advantages to be bestowed, if a temporary telegraph line had been erected to Coolgardie, and if greater expedition had been displayed in the laying of a light railway line into the back country. The difficulties in neither case are unsurmountable, and any extra cost incurred would have been more than compensated for in the increase to the public revenue.

Another matter requiring urgent attention is the water supply and sanitation of Coolgardie. No doubt the aridity of the place has been magnified and overestimated. A country so well timbered as that appears to be must have a greater rainfall than is represented, and in the opinion of men who have visited the field, a scheme of conservation is all that is required. We are told that the country is admirable for dam making, and, this being so, no time ought to be lost in providing a water supply for the gold field. The government evidently recognizes this. It has been decided to purchase steam scoops for the purpose of sinking the necessary tanks, and more lately we learn that Mr. Jobson, who had charge of the Stephen's creek water works at the Barrier, has been appointed to construct and supervise the scheme. Our special representative, who is now en route to Coolgardie, forwards this week an interview with Mr. Z. Lane, who has just returned. He says, practically, that Coolgardie, while it possesses natural advantages denied to Broken Hill, will never approach the silver wonder in magnitude.

As yet too little work has been done to disclose the potentialities of the place; and until the wet season sets in and development work is commenced, the "good shows" of Coolgardie may be counted on the fingers of one hand. Two things it is very evident are necessary to render mining a success—capital and machinery. The claims in which dollying stone is found are few; the claims which have battery stone constitute the bulk, and money and plant are necessary to turn them to advantage. It is the latter which are being so freely placed on the market, and unless the public safeguard their interests by demanding that money subscribed shall go into the mine, instead of into the pockets of promoters, they must prepare to be disappointed.

HARVARD UNIVERSITY proposes to locate an observatory station in Arizona. Such a station has been the plan of Professor Pickering for years, but he has never before had the necessary financial backing. Percival Lowell of Boston has just donated a large fund for this purpose, and Mr. Lowell will go as a member of the party. A. E. Douglass, assistant in the Cambridge Observatory, will leave before the other members of the expedition, in order to make experiments. William Pickering, who led the Harvard expedition into Peru, will manage this work. The station in Arizona will be for visual investigation, as the Harvard station in Arequipa, Peru, is for photographic purposes. This will give the Cambridge Observatory two of the best locations in the world. The great Bruce photographic telescope now being tested will be shipped to Peru. It will be the largest of its kind in use.

The Water Supplies in the Arid Regions.

Part II.

By J. W. Powell, Director of the U. S. Geological Survey.

The Sources of Water Supply.

The preliminary question of the duty of water having been examined, it is proposed to indicate the source of water supply for the regions of the United States where irrigation is practiced. The rainfall of the arid region is variable, ranging from 3 to more than 20 acre-inches per acre of surface. It is to be carefully noted that the rainfall is variable not only from district to district, but also from year to year and month to month, and that the yearly and seasonal variations are very great.

Peculiar Conditions.—There are large districts in the arid region where, in extreme cases, not a drop of rain falls for an entire year, while in other years the very same regions experience terrific storms, and utterly arid deserts are suddenly transformed by the creation of storm-water streams, and rivers roll as floods, creeks as torrents, and brooks as leaping waters. Scattered throughout the arid region are many mountains towering above the valleys and performing the beneficent function of condensing the waters from the heavens and gathering them into lakes as natural reservoirs for perennial streams. These mountain-gathered waters constitute the most important supply for the fertilization of the land. Throughout the arid region there are many comparatively large districts which have no perennial streams, and these districts increase in size from north to south until districts as large as any one of a number of the Eastern States are found within a single living stream. But all of these districts without permanent rivers and creeks have storm-water streams that are sometimes of great volume. Throughout the arid region streams rise in the mountains and flow into valleys so arid that the waters are all consumed by the thirsty soil and evaporate into the wind-vexed air. Sometimes the sands do not drink up all of these waters, and salt lakes are formed, from whose noxious surfaces the waters are discharged by evaporation.

Having determined the mean rainfall of the arid region with a reasonable degree of accuracy, we have next to determine what becomes of the rain.

"Runoff" and "Flyoff."—When it falls upon the earth a part of the water is gathered into streams and is carried away into sinks, lakes and the ocean; let us call all this stream water *runoff*. Another part is carried away by the air, and this air-borne portion is in part evaporated from the surface of the land and from the leaves of plants, while another part is delivered to the air by transpiration. All this air-gathered water is drifted away by the winds, and therefore let us call it *flyoff*. The rainfall, then, is divided between runoff and flyoff.

The Geological Surveys has been engaged for several years in an investigation designed to determine the relative proportions of flyoff and runoff, in order to properly account for the disposition of the rainfall made by nature. It is proposed to give the general results of this investigation.

Knowing the rainfall, we must then determine the runoff, and this is done by gauging the streams. All the streams have not been gauged, but many have been, and these have been selected as typical cases.

An Analysis of Runoff.—It has been found by observation that the runoff is variable in three ways: 1. It varies with the amount of rainfall. If the rainfall is greater the runoff is greater. 2. It also varies with the character of the rains. When the rains come in great storms a large proportion runs off. A gentle shower is found to be almost wholly evaporated. If a year's rainfall is concentrated into two or three great storms, it will largely go into the streams, but if distributed through many showers it will be returned to the air. 3. Again, topographic conditions greatly influence the runoff. In a region of steep hills, mountains and canyons, with many naked rocks, the runoff is very great; in a level district, where loose sands and soils prevail, the runoff is small. Thus the rainfall becomes runoff in an unequal degree by reason of the inequality of storms and also by reason of the inequality of topographic features.

In gauging the rivers of the United States, results have been reached as follows:

Where the rainfall is 40 inches the runoff will be 20 inches; one-half is runoff and one-half flyoff. Where the rainfall is less, the proportions are changed. With 30 inches of rainfall, 18 inches will go to the air and only 12 inches to the stream—two-fifths runoff and three-fifths flyoff. But the amount will be variable in different districts, because of topographic conditions. With 20 inches of rain the amount of runoff will be 5 inches—one-fourth runoff and three-fourths flyoff. But the proportion will vary by reason of topographic conditions. Where the rainfall is 10 inches the runoff is a little less than 1 inch—one-tenth runoff and nine-tenths flyoff, but variable by reason of

topographic features. As rainfall diminishes, topographic conditions have greater control. At ten inches and below, topography almost wholly controls the runoff. Where the rainfall is the same, the streams may be few and small or many and great. There are large tracts of country in Arizona, southern California and Nevada where 10 inches of rainfall never gives a permanent stream and rarely a storm stream. There are other districts of country where 10 inches of rainfall gives birth to many living waters. If the lands are comparatively level the sands drink all the water; if the lands are traversed by canyons carved by rivers that have their origin in the mountains, a labyrinth of lateral canyons is formed and the rainfall is promptly gathered into streams which roll into salt lakes or into the sea. The rain in the desert is gulped down by the sand; the rain in the canyon is gathered into a creek.

What Becomes of the Rainfall?—We must now get a clear understanding of what is meant by runoff. Most of the streams of the United States ultimately discharge into the ocean; all of the water thus carried to the sea is runoff. Some of the streams of the arid region empty into salt lakes; all the water thus discharged is runoff. A very large number of small perennial streams of the arid region are discharged into what are usually called sinks—that is, into small valleys, where their waters are evaporated; all this water is runoff. There is still a great multitude of small storm-water streams that live only a short time after a rain and whose waters are gathered into sand valleys and evaporated, or into perennial streams; all such waters are runoff. Much rainfall sinks into the soil; a part slowly evaporates and becomes flyoff, but another part issues again as springs, and spring water is here considered as runoff. Rivers, creeks, brooks, storm-water streams and springs constitute this available water which we call runoff.

The water supply for irrigation in the arid region must mainly come from the runoff where the rainfall is 20 inches or less, for, with some exceptions, it is the runoff water which is used in irrigation. Crops are not raised throughout the entire season, but during a period varying in different portions of the country, and with different crops, from 60 to 150 days. If the rainfall of the entire year would come during the growing season, with a fair distribution throughout the days, a large part of the arid lands could be cultivated without irrigation, but, in fact, the rainfall is unequally distributed throughout the year.

Inequalities of the Rainfall.—The inequalities of rainfall through the season are very great. Everywhere throughout the arid region it often occurs, now here and now there, that no rainfall comes during the growing season, so that it is necessary for the farmer to provide by irrigation water for the entire crop. He may have rainfall and he may not. If, therefore, his agricultural operations are to be successful from year to year, he must provide all the water necessary for the crop. The water which can be utilized for this purpose must come from the runoff, with exceptions hereafter to be mentioned.

We have given certain laws relating to runoff for definite amounts of rainfall of 40, 30, 20 and 10 inches. Now, it is proposed to apply these laws to the arid region by district of country, and to show the average runoff by such districts; and for this purpose we shall consider runoff in zones or regions where the runoff varies from 20 to 30 inches, from 10 to 20 inches and from 0 to 10 inches. Of course, these zones everywhere run into one another; definite lines of boundary are not made in nature, and only approximate lines of boundary can be laid down.

(To be Continued)

The Greatest Bullion Output.

The largest bullion shipment ever made from the Comstock in one lot was on the night of December 31, 1877. It included 133 bars from the Consolidated Virginia mine and 129 bars from the California. The aggregate weight of the bars was 32,818 pounds, valued at \$1,099,099.71, says the *Territorial Enterprise*.

The total combined yield of Consolidated Virginia and California mines in the year 1877 was \$32,658,869. The total bullion yield of the State in that year was \$51,580,290, according to the annual statement published by Wells, Fargo & Co.

The total combined yield of the Consolidated Virginia and California mines from the discovery of the vast ore body on the 1,400 level up to July, 1878, was \$100,011,285.

At the close of the year 1878 these two mines had paid out in dividends up to that date a total of \$76,731,000. Since the consolidation in January, 1886, of the two mines, under the title of the Consolidated California & Virginia, the total sum paid in dividends from the ore discovery in the north end of the mine in that year was about \$2,500,000 and the total amount paid in dividends from ore extracted from the ground now consolidated under that title was more than \$80,000,000. The total yield of that ground to date is not less than \$120,000,000.

The Kern County Mines.

Gus Routh, a prospector, recently went from Porterville, Tulare county, to the new Kern county mines, and he writes thus to the *Enterprise* regarding the district:

We arrived here January 21st. Our trip was uneventful with the exception of heavy rains and snow storms while crossing the mountains. We are located thirty miles north-east of Mojave, thirty-five miles east of Red Rock and twenty-six miles east of Goler.

The climate here is fine, about the same as Porterville; some colder nights; no rain or snow, and very little wind. The altitude is 3100 feet, the nature of the country volcanic—three or four extinct craters in a radius of ten miles.

Two of the mines are paying well, avering from three to fifteen dollars per day to the man. There are some forty or fifty men here, all sociable, jolly fellows, always ready to help their fellow man. That is characteristic of the miner.

Considering the time we have been here we are doing well and have bright prospects ahead of us. We have some good claims. A large portion of the land in this district is located, but claims can be bought at nominal figures. For the benefit of anyone wishing to come I would suggest that they come via Tehachapi to Camerson. At that point leave the railroad to the right. Six miles from Camerson you intersect with the old Borax road, one of the best in the State. It is sixteen miles from there to Red Rock, twenty-six to Goler and forty-three to the Summit. On starting bring provisions to last six weeks, as you may want to return, and money to buy a dry washer. They cost from \$30 to \$75. Nothing can be accomplished without one. And do not expect to find nuggets on top of the ground, or growing on bushes. You may expect to meet with many hardships, and will have use for a pick and shovel.

Hay is worth from 1½ to 2 cents per pound, barley \$1.50 per sack, and can be bought at Red Rock, Goler, Kane and Mosquito Springs—all along the line of travel. Six miles from Camerson, at the junction of the Borax road, there is plenty of good water; five miles from Red Rock station, plenty of water; Kane, spring water for stock; Mosquito Springs, good water; and four miles from us as good water as can be had anywhere. All it costs is to help yourself.

Our nearest postoffice is Koehn, twenty-six miles west, in the Goler district.

Roasting Tailings.

Pankey & Fine, operating the Easton mine at Virginia City, have adopted a new scheme by which they claim they will save the full assay value of their ore, says the *Butte Inter-Mountain*. Their method of working the ore is as follows:

1. The ore is crushed, passing through a 7x10 Blake breaker.
2. Through a 24x30 roll.
3. Through a five-foot Bryan mill, wet crushing, 20-mesh screens.
4. Concentration of entire product on Frue vanners.
5. Drying the tailings from the vanners.
6. Roasting the semi-dried tailings and introducing chloride gas to release the silver and gold from the sand.
7. Amalgamation of the roasted material in pans and settlers.

The result is two products, viz., bullion and concentrates.

The idea of roasting the tailings after separating the concentrates is quite the reverse of the process employed in chloridizing silver mills, which lose 50 per cent of the gold in roasting as a whole, 10 per cent in the settlers and another small loss in amalgamation.

Mr. Fine first directed his attention to the white sand (silica particles) in the tailings. A gravity test was made in Denver where it was found that the transparent white particles, apparently not containing the slightest trace of metal, yielded 12 ounces in silver and \$4 in gold. Here then appeared the leakage which accounted for the loss when worked by any known process, but which can be saved to the highest percentage yet attained by the new departure alluded to.

The greatest portion of the gold is in the concentrates, which from the Easton ore is shipped and will yield from five to eight ounces in gold. Compared with the assay value, from 50 to 60 per cent of the gold and from 30 to 37 per cent of the silver is saved on the concentrators.

The idea of using a 20-mesh screen—besides increasing the capacity of the crusher to 25 or 30 tons per day—is the fact that the particles will calcine to better advantage.

A machine shop and other necessary accessories, besides the roaster and dry floor on top of the dust fines of the roaster, will be the new features added to the Fine & Pankey mill on Granite creek.

The Deep Leads of California.

Prof. Arthur C. Lakes of Golden, Colo., in *Colliery Engineer*.

A "deep lead" lies deep below the surface, often covered by beds of lava, especially in California. These lava beds may be many in number, and hundreds of feet in thickness. The "deep lead" is an ancient river bed.

In the Sierra Nevada the gold is derived from metamorphic crystalline rocks of the range, partly from quartz veins in the slates, and partly from gold distributed in minute quantities all through the metamorphic rocks. The quartz veins lie between the planes of stratification of the slates, also in irregular bunches and lenticular masses of limited extent. In many localities, the rocks are penetrated in every direction by little irregular quartz veinlets, which often carry gold, and in spots are extremely rich, even where the quartz vein is only an inch thick. In some California districts wherever a basalt capping exists, the drift beneath it is auriferous.

In California the modes of occurrence of auriferous gravel deposits are various.

Sometimes they exist in well-defined ancient river-beds under a capping of basalt which has filled the channels of the rivers in past ages. Again they appear in isolated mounds or hillocks evidently the remains of such channels, which being unprotected by a covering of lava, have been broken up by the action of the elements. Also in basins or flats, which have received the wash of these disintegrating rivers, also in low, rolling hills near the base of the Sierras and beyond the reach of the lava-flows. One of the most remarkable and important gold leads is that beneath Table Mountain in Tuolumne county. The waters percolating through these lava flows and reaching the gravels beneath are charged with alkali from the lava. These alkaline waters are charged with silica in solution from the same source. Hence the fossil drift-wood of these ancient rivers has all been silicified by these silicious waters. The gravels are also cemented by the same material. These percolating waters also contained iron, for iron pyrites is found in contact with the silicified woods. In this iron-cement, gold is found in rounded grains and in minute crystals, and threads deposited by a solution of sulphate of iron at the moment of the reduction of the latter to a sulphide.

The dead rivers of California are on the west slopes of the Sierra Nevada, from 500 to 7000 feet above sea level. The largest and richest lead is the big "Blue lead" traced 65 miles and even 110 miles. It was parallel with the main divide of the Sierra Nevada. The live modern rivers run at right angles to it, cutting canyons 1500 to 3000 feet deep. The "Blue lead" runs across these ridges from 200 to 1000 feet below their summit. The lead was discovered by following up surface washings. Miners found that the modern streams were richly gold bearing up to a certain point, increasing as this point was neared but ceasing when it was passed. These parts were in the line of the different streams and by following up indications the lead was eventually struck on several sections and tunneled on. The deposit is 300 feet deep composed of gravel boulders, clay and sand, so strata distinguished by degrees of fineness, by the character of the rocks, and the amount of gold, also by colors, the prevailing color being a blue-gray. Gold is coarser near the bottom, and contains a greater alloy of silver. The silver in the gold in the upper strata has been eaten out by sulphurous acid resulting from decomposition of iron pyrites. The whole deposit is like that in existing rivers, showing banks, bars, eddies, falls, rapids, and riffles. There is much gold in the eddies and but little in the rapids. The space between the boulders is filled with sand and contains gold, the bedrock is slate.

Where dead rivers meet, the "wash" is generally rich. Where a lead becomes very narrow, dips fast, and is inclosed between steep walls, the gold will be very sparingly distributed in holes and behind ridges and will be coarse in size.

Very large and abundant boulders in gold-bearing stream-beds are often a serious obstacle in getting out the gold, from the difficulty of handling them. More than one placer has been abandoned from this cause alone.

Willows Used to Build Dams.

The willows which grow along the shores of the Mississippi river are of no use in the arts, but when it comes to building a dam the engineers find nothing half as well as the humble willow. It lines the shores, and can be easily reached from the barges whereon it is transported, and it is so soft that it is easily cut and handled. It is woven into a great, loog, continuous mat.

One end of this is anchored to the shore, says the *Waverley*, on one side of the chute that is to be dammed, and the process of weaving is thence carried on straight across the stretch of water on a peculiarly shaped boat called a grasshopper. As fast as the mat is woven on grasshopper it slides into the water at the lower end of the

inclined weaving rack, and it is laden with rocks and carried straight to the bottom, and this is continued until the opposite shore is reached.

The mat is then covered to the proper depth, 12 to 15 inches, with rock, and then another mat, made in the same way, is woven and laid down on top of the first, and similarly weighted down, and this work is continued until the dam has risen as high as it is intended to stand, the finishing being always a heavy coating of rock that covers the willow and all.

The willow, always covered with water and the mud that inevitably lodges among the rocks of the dam, is kept sealed air-tight, and of course does not decay. It binds the rocks together and prevents the dam being shoved out of place by ice, or disturbed by the pressure of the current at high water. It is good for no other purpose save to hold a shore that is washing away with its roots, and for dam construction it is superlatively the thing.

Up the Klamath River.

Correspondence Blue Lake Advocate.

In my last letter I stopped writing at the Mettah mine. From here, if we go up the river four miles, we come to the old Morek Indian village, situated on the north side of the river at the foot of what is known as Morek hill. From here up the hill, something over a mile, brings us to the Morek hill mine, which is located 2300 feet above sea level. Here we come to a formation which seems to antedate any of the beds of gravel which we have examined. We have found the beds of gravel below this point to be of recent formation; in other words, they appear to have been formed by the present river system, yet we claimed they were fed by the Morek hill channel and not by the present river.

Then we claim for Morek hill another and entirely different formation, dating back to remote ages, to a time anterior to the present facial formation of the country, to a time before the present water courses had commenced to cut the channel, which to-day have reached a depth of thousands of feet below the gravel deposits in Morek hill. I will give two reasons for this conclusion, and then I will tell you something of the prospects and expectations of this mine, when properly developed and systematically worked.

Geological Formation.—1st. Taking the general trend of the lower Klamath we see the flow of water to be toward the northwest, while the Morek hill channel, as far as opened and traced, has evidently flowed toward the southeast. The present opening of the mine has every indication of being close to where this ancient channel was cut by the present river channel.

2d. The character of the gold, the sand and the gravel found in this channel is entirely different from anything found above this point on this river, while on the other hand the character of the gold and sand in this mine is exactly the same as in the mines we examined farther down the river, with the exception of Mettah, which was heavy gold. But Mettah was worked entirely by drifting, the gold all coming from the bedrock. The overflow of the gravel and the placing of it in those lower beds by the action of water have caused marked changes in the appearance of the gravel as compared with that found in Morek hill. But the close observer finds nothing in the gravel beds down the river that is not found in Morek hill; yet in the Morek channel we find some things which are not noticeable in the channels of more recent formation, as witness the immense quantity of decomposed gravel found in Morek. While in the beds below the decayed gravel has been dissolved and carried away, the solid went to fill up the beds of more recent date.

Morek Hill.—Now I will tell you something of the prospect in Morek hill, which, if I am rightly informed, would seem to leave no doubt in the mind of any one as to the richness of this mine. The present company have been to considerable expense in bringing the water to the mine.

One year ago they commenced opening the mine. At first the prospect was discouraging. On opening the channel they ran back 100 feet, at which point the gravel was 100 feet thick, and there did not appear to be enough free gold in it to pay for working, although a more thorough test showed fair prospects of rusty or gold-stained gravel, with base metals. The bedrock appeared to have nothing on the dip going into the channel, and it was found at this point that the rock had dipped so much that the works were not enough to drain the mine. After running back into the channel 150 feet, there was a stratum of gravel struck at the surface, 100 feet above the bedrock, which dipped as it went back at an angle of 50 degrees.

After going back 50 feet farther with dip of this pay stratum and the rise of the surface, there was a bed of gravel exposed 60 to 70 feet thick, from which it was impossible to take a pan of dirt and not find gold in it. Generally there would hundreds of colors show in a pan of dirt. But the gold was hard to save on account of the

light and float quality and the large quantity of heavy sand. The only wonder is that the company would hesitate with such a prospect as they have to put the water on and fit up the mine.

The Alaska-Treadwell Mine.

Correspondence of Dr. J. M. Buckley in *Christian Advocate*.

Douglas island is twenty-five miles long, and from five to eight in width. Twelve years ago it was an untouched wilderness. A few miners having made a camp on the shore, John Treadwell of San Francisco, a builder, took the claim of two of them to secure him for a loan of \$150. The debt was not paid, and he took possession of the property, afterward purchasing the claim of M. Pierre Joseph Ernsara, known as French Pete, for \$300. He associated with himself as equal partners Frye, Freeborn and Hill of San Francisco; and John P. Jones, now, as then, Senator from Nevada. Since that time they have spent over \$800,000 upon the works. It cost \$100,000 to complete a ditch eighteen miles long. They invested \$300,000 in experimenting to find the best process of chlorination.

As this word explains the whole process, I will define it. Gold, as is well known, is found in quartz; also in pyrites. In metallurgical operations there is often a residuum in which gold is found. It has been discovered that chlorine gas has the power to transform metallurgical gold into a chloride. When this is done it is a simple thing to dissolve the gold out of water and reprecipitate it in a metallic form. Platner, of Germany, invented the first of these operations about 1851; but his processes have been improved upon. The mill never stops, day nor night, summer nor winter, except to set new machinery. I went up to the open pits where the ore is quarried; saw the tremendous boring machinery above and the workmen breaking up the stone below. There are chutes to cars in the tunnels below, and gravity takes the ore down through the successive processes. Trains are always moving there; blasts are constantly being fired in the pits. Each day they mill 600 tons of ore, to do which costs \$1.25 cents per ton, and it averages from \$3 to \$7 per ton in value. This mineral region has never been examined by the Geological Survey, and it is a riddle to geology. Vegetation for a mile along the edge of the island is killed by the smoke from the chlorination works.

It is impossible to imagine the noise of the 240 stamps. The human voice cannot be heard, and for hours after going out of the mine there is an echo of the roar in the head. The stamps, like so many trip hammers, rise and fall and pound the ore fine so that it can be further treated.

The company has refused \$16,000,000 for the mine, and the gold actually in sight is estimated at \$28,000,000.

Direct Treatment of Pulp by Cyanide.

A modified method for securing direct treatment of the pulp leaving the battery is to be tried in connection with the cyanide process by the Robinson Company at Witwatersrand. Where pulp has been run direct into cyanide vats, two difficulties have been generally encountered, one being due to the packing of the sands as a consequence of currents in the solutions from which they are mechanically deposited, and the other to a segregation of the "slimes," or finer particles of the pulp, giving rise to imperfect filtration and extraction. These difficulties have, to a certain extent, been overcome by the use of hydraulic separators at some of the mines, but the principle of the method which will now be tried at the Robinson Company is to allow the pulp to settle through solutions which, below their surfaces, are in a state of rest, it being found that, by this means, successive portions of the sands carry down with them a certain proportion of the slimes; that an intimate mixture, without segregation, is thereby brought about, and that, in consequence, the resulting product is easily susceptible of cyanide treatment.

With this object, the pulp leaving the battery is run direct into intermediate vats fitted with bottom discharge, in which the mixing is effected, prior to the tailings being carried to the cyanide vats proper for treatment. It is asserted that the extra cost due to the necessity for a single handling is extremely small, and that the slight economic disadvantage thereby occasioned is amply counterbalanced by the increased percentage of extraction that can be secured, as a consequence of the tailings having been brought into the condition most suitable for chemical treatment, the mixing of the "slimes" and sand effected in the vats being naturally assisted by the discharge and re-delivery from trucks. To ensure a distribution of the pulp in a uniform manner without violence over the whole surface of the intermediate vats, an arrangement resembling in principle a garden sprinkler will be made use of. The cost of the extra vats required for this intermediate settling process will not be large, as the moment a vat is full it can be at once discharged.

Scientific Progress.

Air Reduced to a Solid by Cold.

About a year ago Professor James Dewar of London converted air and its constituent gases, oxygen and nitrogen, into liquids by means of intense cold, says the *New York Tribune*. The temperatures necessary were 182 degrees below zero, C., for nitrogen; 192 below for oxygen, and about 200 below for air. Soon afterward, although it did not attract much attention then, he actually congealed air. In some public lectures given in London, a few weeks ago, he again produced solid air, at a temperature of 210 below zero, C., or 346 below, Fahr. This time the feat created a public sensation, and the non-scientific press is now making the matter generally known, although Professor Dewar has, in the meantime, done little but improve his apparatus so as to increase its output. He has not produced any more intense cold than before.

So small was the quantity of solid air made on this recent occasion that it could not be passed around for inspection conveniently. The demonstration of what he had done was made to the audience by means of a ray of light thrown by a lantern through the freezing tube upon a screen, and what was shown to be a liquid at one time afterward appeared in such a condition that it would not move when shaken.

These low temperatures, toward which the chemists have been striving for years, are to be regarded only to a limited extent as ends, and more as means to ends. To be sure, it would be a great thing to reach 273 below zero, C. (459 Fahr.), for this is the absolute zero below which it has been supposed impossible to go. And it was inaccurately reported last summer that a Frenchman, Pictet, had actually reached that goal. But the important practical phase of all this business is the change wrought in the properties of matter by such temperatures. Among the new points brought out this winter by Professor Dewar are that at 180 degrees below zero, C. (292 below, Fahr.), metals gain in tensile strength, steel becoming almost twice as strong as at ordinary temperatures; colors are somewhat modified, and rubber becomes more extensible. An electrical discharge, moreover, which usually goes through a vacuum with a beautiful luminosity was literally frozen out and driven back when the vacuum tube was reduced to a very low temperature.

The means employed in producing this cold, it will be remembered, is the evaporation of highly volatile substances. If, in a room where the air has a temperature of 70 degrees Fahr., one pours a few drops of water on the mnsln covering of a "wet bulb" thermometer, the mercury will fall 10 or 12 degrees, possibly more, the result depending on the atmospheric humidity. But if, instead of water, alcohol is used, its greater evaporative power will lower the reading about 25 degrees, and good sulphuric ether about 50. Thus one can, with proper appliances, freeze water in a warm parlor. But there are much more volatile substances than these; namely, gases which have been reduced to liquids under enormous mechanical pressure, and then liberated. Sulphurons (not sulphuric) acid may be used to freeze mercury; chloride of methyl gives 70 or more below zero, C.; carbonic acid, 100 below; and bisulphide of carbon and nitrous acid, 140 below, C., or 220 below, Fahr. To liquefy oxygen, Professor Dewar employed three steps: First, he put the gas under great pressure, about 750 pounds to the square inch; this enabled him to secure the result at 145 below, instead of 192 below. Then he liberated nitrous oxide gas, which had been under a pressure of 1400 pounds, by which process he was able to produce a temperature of minus 90 C. around a small chamber, into which he introduced ethylene under a pressure of 1800. When the inner

receptacle was full, evaporation was resorted to, and facilitated by a vacuum. This gave minus 145 degrees. Oxygen being thus liquefied and under pressure, it was employed in the same way as ethylene, freed from pressure and evaporated in a vacuum, and then the extreme temperatures already referred to were secured. There is enormous waste in handling these liquids. For every pint of oxygen in that form applied to use, Professor Dewar loses nine. This fact and the mechanism for compressing the gases make the work enormously expensive.

Inter-Relation of Forces.

Water freezes and becomes ice at 32° F., whereas mercury only freezes at 39° below zero F.; olive oil, on the contrary, shows signs of congelation at from 40° to 45° F. The three substances quoted being all liquids, the difference in the loss of heat requisite to bring them to solidification is very great indeed, says the *Westminster Review*.

The action of heat on fluids or solids is equally various. Water boils at 212° F.; lead melts at 612°; the fusing point of gold is 2016° and of iron 3000°. We give these particulars in order to show what enormous changes can be effected by cold in the transmutation of a substance from a liquid to a solid, or by heat from a solid to a liquid state. Ether boils at 96° F., but has never been frozen by the severest cold. The forces exerted by the action and reaction of heat and cold are best exemplified under the head of steam, which has only been called forth and made use of by man since about the middle of the eighteenth century, but it has been in action on a gigantic scale in nature for probably hundreds of thousands of years, it being the opinion of many geologists, including Lyell, that it is the generation of steam, whether developed by the internal heat of the earth in a state of fusion or whether by that of the chemical action of the elements in the bowels of the earth developing heat, which, acting on water and thus generating steam, is the great force that throws up such enormous rocks and masses of lava as Etna has lately been doing. The rocks and lava thus thrown up are in a state of fusion by heat; but they gradually cool by exposure to the air and form solid rocks and mountains. This action and reaction has been going on for thousands of years with little cessation.

Heat and cold, again, cause the oceanic currents on our earth between the equator and the poles, and *vice versa*, and thereby affect the earth's magnetism or polarity, not only on our globe, but probably all throughout the universe. This is borne out by the fact that the "aurora borealis" is decidedly an electrical phenomenon, which takes place in the highest regions of the atmosphere, since it is visible at the same time at places very distant from each other. Dr. Faraday conjectures that the electric equilibrium of the earth is restored by the aurora conveying the electricity from the poles to the equator."

The Stethophone.

One of the new telephones now made available to the public by the expiration of a recent patent combines in a single instrument the transmitter and receiver. While this is in use, one part is pressed against the ear and another, curving under the chin, rests lightly against the throat. A button here receives the vibrations of the speaker's larynx and transmits them to the electrical parts of the apparatus. It is not necessary to aim the voice into a tube or cavity. A person talks into the open air without reference to any box on the wall. One advantage claimed for this contrivance is that, as the button is in contact with the user's throat, no other sound in the same room can vibrate it when he is not speaking, and hence the listener is not liable to be confused as he

now is sometimes by strange voices and other loud noises. This instrument is called the "stethophone" from its partial resemblance to a stethoscope, which physicians use in detecting faint sounds in the heart and other human organs.



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Mechanical Progress.

A New Method of Exchanging Messages Between Ships.

A new method of signaling through water is the invention of Captain Neale, and is intended for the exchange of messages and the carrying on of conversation between ships on the sea or on rivers, whether moving or stationary, or between ships and light-houses and harbors, forts or piers on the shore, says the *World's Progress*. Communication is effected without any connection whatever between the two objects except the body of water in which the ships float or the lighthouse stands. The system utilizes a well-known law of acoustics. If a musical note in a given key be sounded, an object capable of emitting sound in the same key will, under certain conditions, sympathetically respond with a sound similar to that which induced it, it being, of course, a primary condition that the two objects shall be normally tuned in unison. Capt. Neale's invention is based on this principle, and, utilizing the high conductivity of water for the transmission of sound, he has constructed a signaling apparatus consisting of a transmitting and receiving instrument, which are effectively operated without being in any way connected with each other, except through the medium of water.

In the recent test the apparatus was mounted on two punts, moored about two-thirds of a mile apart, and carried a transmitter and a receiver respectively. The transmitter consists of a bell about 16 inches in diameter, attached to the lower end of a framing, which is fixed to the side of the punt, at the upper end of which is a crank handle. This handle, worked from the punt, actuates a double heat hammer, which strikes and sounds a bell submerged about six feet. The Morse code is employed. The receiving apparatus consists of a pair of metallic drums about ten inches in diameter, open at one end and fixed, mouth to mouth, upon a piece of board placed between them. These drums, suspended in the water, are connected up with a small battery, and through it with a tape-recording instrument. Messages were correctly transmitted and recorded. The speed of operating was somewhat slow, as the signaling had to be carried on by hand instead of by electricity, which will shortly be utilized. The trial, however, was most successful, and is said to have demonstrated the practical character of the invention and the correctness of the principles upon which it is based.

An Ingenious Smoke Consumer.

The "air grate" is a device, by means of which, it is claimed, as nearly as possible complete combustion is obtained, all the carbon in coal extracted, and the combustible properties of other fuels more fully utilized than heretofore, says the *Coal Trade Journal*. The grate is constructed of hollow cast-iron bars, so made that a regular pressure of air can be supplied into them, coming out through a slot on the top of the bar, and at that point causing rapid and perfect combustion with the aid of the natural draft.

This method of supplying air does not constitute a forced draft as commonly understood, because the natural draft is also used in conjunction with the air blast admitted through the bars, the combination of the two, that is, the natural draft and the air blast, producing perfect combustion. It will be seen that this system renders the use of fine coal and screenings possible, because the oxygen is carried to every part of the mass of coal and consumes all the carbon that is in it.

It has been demonstrated in actual practice that the use of this system of hollow grate bars, patented by C. H. Gadey of Chicago, effects a saving of 25 to 30 per cent in the cost of fuel. In cases where boilers are

not making the required amount of steam it increases their capacity 25 to 30 per cent. The difference in temperature between the grates and coal, caused by the circulation of air through the bars, prevents the adhering of clinker, and in addition to this makes it impossible for the bars to burn out. Thus, their extreme durability becomes an important point in considering the cost of this system. These grates will replace any other kind of grate bars without involving any change whatever in the construction or form of the fire box or chimney.

A New English Torpedo Boat.

The English Navy is being augmented by the addition of a number of new torpedo boats, or, more technically, torpedo-catchers, some 42 in all, costing in the neighborhood of \$200,000 each.

The Havock, the latest acquisition, built by Messrs. Yarrow, has developed a remarkable speed. She is propelled by twin screws of the three-blade pattern. These screws are actuated by engines of eighteen inches stroke. The cylinders are 18, 26 and 39½ inches. Power is furnished the engines by two locomotive boilers provided with copper fire-boxes and copper tubes. The total grate surface is about 100 square feet, and the total heating surface about 5000 square feet. The dead-weight on board was 35 tons. In a trial for speed, the Havock made a three-hours run in rough weather with a 30-mile wind, at 26 knots per hour. On the measured mile, the mean of four runs was 26.78 knots, the fastest mile being made at the rate 27.56 knots and the mean of the next two runs was over 27 knots. The indicated horse power was 3400, and the engine revolutions 362 per minute. The Havock is equipped with the usual hood or turtle back, although some modifications have been adopted to insure a drier deck when the craft is heaving a heavy sea.

In the trial of the Havock at an economical speed, in an endeavor to learn what distance the vessel would steam with the fuel on board, she made 11.2 knots with less than a quarter ton of coal consumed per hour. At ten knots, three and one-half hundredweight per hour sufficed. As the hulkers are of 60 tons capacity, the Havock can make 3500 knots at one coaling.

Useful Information.

The Name of California.

Thomas E. Slevin, LL. D., recently delivered an unusually interesting lecture on the "Origin of the Name California" before the Geographical Society of the Pacific at Union-square Hall. Mr. Slevin first proceeded to explain the various alleged origins of the word California. These he divided into three classes, the most plausible of which was the supposition that the name was derived from a misunderstanding of some words used by the natives when first addressed by Cortez or one of his followers. This was satisfactorily explained away and the speaker then told in a pleasant manner what he conceived to be the only legitimate conclusion to be drawn from the various explanations of the origin of our State's name.

The word California was first used in a work on Spanish chivalry published in 1510. This work was an alleged history of the adventures of "Amadis of Gaul and his son Esplandian." It was of great length and divided into a large number of short stories, one of which was the manner in which "Califa, the Queen of the island of California, a country inhabited only by women, who lived as Amazons and had gold without end," saved Constantinople from an attack by the Persians. This story, as well as others, was widely read by the people of Spain, and by many regarded as fact. Among the staunch believers were the members of the Cortez expedition,

who, upon landing upon the peninsula of Lower California, imagined they were on an island which, owing to its apparent riches, they named after the fable isle, and Cortez himself called the new country "California."

Secret of His Health.

Many hold to the opinion that the majority of people eat too much. We hardly think, however, that people engage in the ordinary avocations of life will be willing to adopt the regimen of a famous old man as told in the *New York Sun*:

He is far along in the seventies, is an indefatigable worker, free from deafness, eyeglasses, rheumatism and other indications of advancing age. His name is withheld at his own request but his method of life is of interest. Until he was forty years of age he suffered from a number of pretty ills. Indigestion was one of them and an overburdening amount of fat another. Almost incessant headaches at night rendered his work uphill and difficult. It was not until he had passed his fortieth year that he came to the conclusion that nearly all his ills came from excessive eating.

He put himself at once upon a regimen which he has maintained for upwards of thirty years. Like Capri, Napoleon and many other great men, he rises at six in the morning in winter, and at five in the summer, and takes a light exercise before dressing. Then he lights an alcohol lamp, boils some water and makes a cup of coffee of two parts of Java and one part of Mocha. The coffee is selected with great care. After it has boiled for fifteen minutes he pours a little cold water on it to settle the grounds, puts in some milk, drinks two cups and eats three or four biscuits. Then he goes in his study and undertakes the most serious problem of the day. For six hours he works steadily. His mind has not been disturbed by any incident, not even by the entrance of the servant with his breakfast. At one o'clock he eats whatever his appetite craves. There is no restriction whatever at this meal. After this he walks religiously for an hour, and during that day not another mouthful of food passes his lips. If at eight or nine o'clock at night a feeling of hunger comes on he takes a glass of milk, but nothing more. He has come to the conclusion that excessive eating kills more people than excessive drinking.

Crossing the Limbs When Sitting.

It really seems as if the women could not be allowed to do anything without being told it is injurious. Yet it is well to heed such suggestions as the following, which is doubtless true. Women who sit with their legs crossed, to sew or read, or to hold the baby, are not aware that they are inviting serious physical ailments; but it is true, nevertheless. When a man crosses his legs he places the ankle of one limb across the knee of the other, and rests it lightly there. A woman, more modest and restricted in her movements, rests the entire weight of one limb on the upper part of the other, and this pressure upon the sensitive nerves and cords, if indulged in for continued lengths of time, as is often done by ladies who sew or embroider, will produce disease. Sciatica, neuralgia, and other serious troubles, frequently result from this simple cause. The muscles and nerves in the upper portion of a woman's legs are extremely sensitive, and much of her physical structure can become deranged if they are overtaken in the manner referred to.

Lemon Juice for Gout.

Details for this remedy were published in the *Lancet*, and the superiority of the remedy over every other demonstrated; yet, strange to say, it has since fallen into comparative desuetude, probably from its very simplicity. It is a fact not generally known that no object in nature contains a larger amount of potassa than lemon juice, though popularly supposed to be acid. This is only

because it is naturally joined to a sharp acid, citric, but which has such feeble affinity for the base that it readily parts with it in the body, and leaves the free potassa to unite with the lithic or uric acid in the system. One case was that of a licensed victualer, a free-liver, who for years had been a martyr to gout. His joints were enormously enlarged, and several of them covered with chalky stones. He was given lime juice largely. The good effects were perceptible within 24 hours after the first dose, and in less than a fortnight a complete cure was effected. The swollen joints gradually resumed their usual size and mobility, the chalky deposit returned to the liquid form and was absorbed. The remedy was continued for several weeks, and it became the favorite drink of the patient. In two years his hands were as small and symmetrical as if they had never been disfigured, and he continued in perfect health.—The Leisure Hour.

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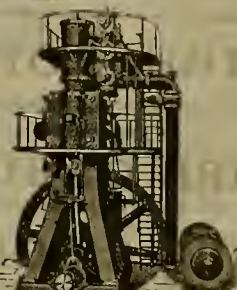
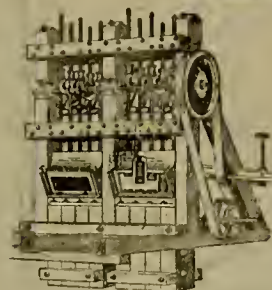
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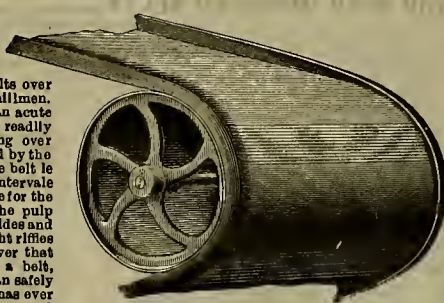
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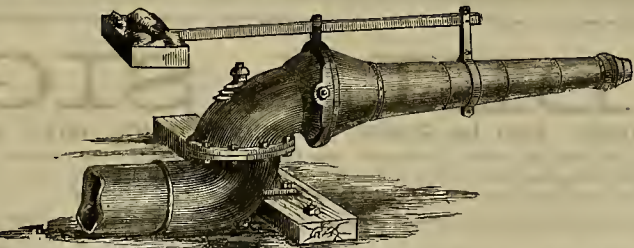
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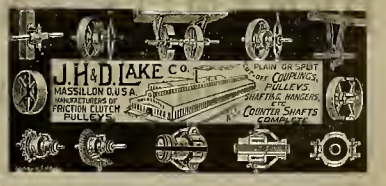
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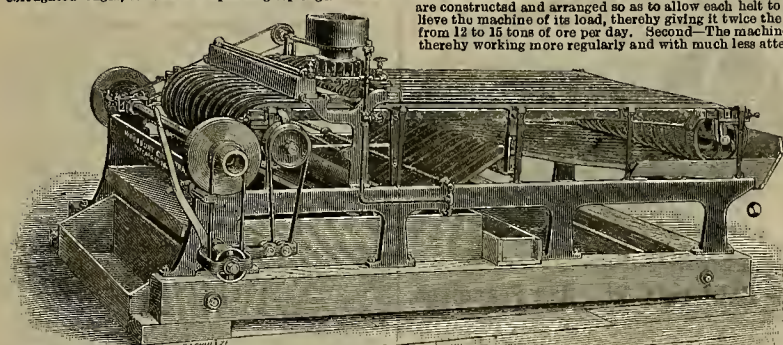
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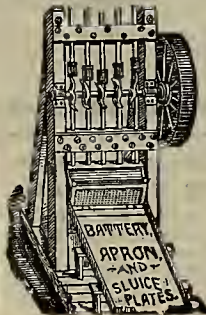
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Mining Summary.

The following is mostly condensed from journals published in the interior, in proximity to the mines mentioned.

CALIFORNIA.

Amador.

THE '54 MINE.—Record: M. D. Nixon, Dr. Nichols and Will Templeton paid a visit to the '54 mine this week. Everything is in fine working order there, and six men are employed. The monitor is running night and day against a 20-foot bank and the earth is disappearing at a lively rate. The company has expended about \$3000 in getting things in shape for work, but they undoubtedly have a fine property and will reap big returns for their outlay.

LAIN OFF.—Dispatch: Quits a number of the miners at the Zells mine have been temporarily laid off during the past few days, owing to the large amount of surface water coming into the mine. It requires the entire time of the engineers to keep the water down, and even then they are making but little gain on the inflow. This misfortune, however, will soon be overcome if the present fair weather holds on a few days longer.

Calaveras.

WORK DISCONTINUED.—Echo: Operations on the Gold Hill mine at Smith's Flat have been discontinued for the present. It is also reported that work on the Smyth mine, near Angels, has been discontinued.

TO REOPEN.—Among the mines in this section which it is rumored will reopen this spring, says an Angels correspondent, are the Smith, owned by Demarest of Altaville; Smith, by Lindsay, Prince & Co.; Stickle and Bennett, by Lindsay & Prince; Gold Cliff, by Hayward, Lane & Co.; Tullock, by Hayward & Co.; Eastland, by Eastland & Co., of San Francisco; Colman, by James V. Coleman; Fritz, by Fritz & Co.; Gold Hill, by Eastern capitalists. There are also the Fitch, Altaville, Keystone, Curtiss, Eclipse and other mines that have had prominence.

UNDER HIS STABLE.—B. R. Prince, the well-known pioneer of Altaville, above Angels, Calaveras county, says that under his stable is good paying ore, and probably in the near future the ground will be developed and a rich strike made at about 14 feet. Mr. Prince's other mines, the Cherokee and Knob Hill, have some rich rock.

El Dorado.

SIX DAYS' RUN.—Nine stamps of the mill at the Gregory mine, El Dorado, after a six days' run, produced last Monday a bar of gold about eight inches long, two inches wide and an inch thick, worth about \$3000.

Inyo.

THE ALABAMA DISTRICT.—Index: The old Alabama district is attracting some attention these days. A claim of 20 acres, over 4000 feet in length by 200 wide, was located last week.

Aids from the rich seams of gold quartz, the placer belt is the most interesting, from the fact that it is most exposed of what appears to be a vast post-pliocene river extending along the base of the west wall of the Sierras from Bodie to Redrock.

In the "Kearsarge and Alabama" days of 1865-66 much gold was taken out of both, but more especially the latter district. The best mines of Kearsarge Peak are under patent to owners who won't work them. As neither are more than a dozen miles from town, they are too near home to be appreciated.

Kern.

BOUGHT A GROUP OF MINES.—Bakersfield Californian: O'Connor and Stenben of Visalia have just completed the purchase of the Stuts & McKee group of gold mines in Agua Caliente district. These mines have yielded over \$20,000 during the past few years and have only been worked about 60 feet from the surface. The three veins—the Wandawa, Bonita and Bell Ruffian—will now be extensively developed, and eventually increased milling facilities will be added. The present mill consists of arrastras run by steam power. During the past workings considerable base metal was found which was thrown on the dump as unfavorable to amalgamation. Assays show that this ore carries about \$40 in silver, at present prices, to the ton, and some of it as high as \$500 a ton in gold.

Nevada.

ANOTHER SALE.—Grass Valley Union: Joseph Southern, the well-known millman, has sold his quartz claim bearing his own name, together with 15 acres of patented ground and improvements thereon, consisting of a dwelling house and outbuildings, to James D. Hague. The price paid was \$3000. The southern claim adjoins the New York Hill and Rocky Bar mines on the south, which claims were purchased some time ago by Mr. Hague.

CAVED IN.—Union: The recent heavy storms caused the Original Hartley mine to cave in for a distance of 30 feet across between the old perpendicular and the new incline shaft. When the company gets ready to clean out the shaft it will have considerable work to do to remove the debris.

MORE STAMPS.—Herald: The Gold Flat mine is said to be turning out some splendid rock now, and the company is preparing to build a mill. They will put in five stamps at present, but will lay foundations for a ten-stamp mill, with the expectation of adding five stamps this year.

This is good news. More stamps means more money in circulation.

THE LEDGE STRUCK.—Grass Valley Telegraph: The ledge in the crescent at the Crown Point mine was struck several days ago. Some of

the ore from the mine was brought to town today and it was very heavy with mineral and sulphurets. This ledge was out at the depth of 200 feet and it measured fully three feet in thickness. This is on the new crescent being run by Messrs. Polkinghorn and party. The strike is regarded as very important.

Placer.

TO REPAIR A TUNNEL.—Colfax Sentinel: Men have been set to work in the old Larson tunnel near Alta to repair it. The Alta Mining Company will run a tunnel into their channel from this tunnel. It is expected that by continuing this tunnel it will strike about ten feet below the gravel in the channel. It will be several months before the tunnel will be completed. A day shift and night shift are at work, and the tunnel will be pushed ahead as rapidly as possible.

Major Hens of the Dabris Commission inspected the Polar Star dam at Dutch Flat last week and pronounced it satisfactory.

NEW MINING COMPANY.—Colfax Sentinel: The Alta Gold Mining Company has recently incorporated with the following directors: W. M. Hall, W. S. Miller, F. S. Chabonne, J. P. Edhoff and J. E. Doolittle. The company has been organized for the purpose of working the Alta mine at Alta in eastern Placer. This mine promised very well a few years ago, but owing to litigation and other hindrances it was closed down. The last gravel worked promised the best of all. The gravel is of the white lead of the same character as the gravel in the famous Hidden Treasure mine at Sonny South. There is every reason for believing that, with improved facilities for working, this mine will become a good paying property. The company has not yet decided as to the manner in which the mine is to be worked, but that will be decided very soon and work will be begun as soon as the weather permits. The company has organized with a capital stock of \$1,000,000, of which \$550,000 have already been subscribed.

Plumas.

THE PLUMAS IMPERIAL.—National Bulletin: Col. M. H. Day, president and manager of the Plumas Imperial Mining Co., accompanied by Supt. Thomas, went over to Greenville Monday, Feb. 12th, purchased 3000 feet of the large Dutch Hill pipe owned by General Chipman, and let a contract for taking up and hauling the same to Hungarian Hill, there to be used in conveying water from the ditch to the hydroelectric mine. In all, there will be about 4000 feet of pipe in use. The pressure secured will be about 480 feet, thus securing good execution. Work on the dam is progressing rapidly, and it is expected to be completed by the end of the present month. The atmosphere is 30 feet wide at the base and will be 10 feet wide at the crest. It will rest on a solid rock foundation, and will be perfectly secure. The site is most advantageously located, enabling the company, by a comparatively small expenditure, to secure a very large impounding reservoir, amply sufficient for the purposes desired. As soon as this dam is completed, the Plumas Imperial will begin the erection of another dam—one at the outlet of Dean's Valley, to enable the company to store and hold in reserve a large supply of water for mining purposes. This will be a most important improvement, adding much to the facilities for working the property owned by the corporation. All this work has been outlined and arranged for, and it is expected to begin mining by the first of May.

Riverside.

STRUCK GOLD.—Riverside Enterprise: It is reported that Messrs. Lang & Son, cattle men on New river, have struck rich gold property in the hills about 20 miles northwest of Indio station on the Southern Pacific Road, and seven miles west of Tingman's two-stamp mill. The ledge is three feet wide and crops for about 4500 feet. Samples taken from three different points give an average assay of \$500 in gold to the ton. The gold is very coarse in the quartz, single pieces worth 60 cents being found. Ten tons of the croppings were taken over to Tingman's mill and yielded \$7000. The finders have a large force of men at work.

San Bernardino.

NEW MILL.—The Morongo Gold Mining and Milling Company, in San Bernardino county, has purchased a ten-stamp mill, which is being moved to the mines, and it is expected to have the property on a producing and paying basis in the near future.

NEW MACHINERY.—Courier: The Miller quartz mill at Middle Creek is to be remodeled and new machinery added. The mill is well located and could be made a paying property working custom contract ore alone.

Sierra.

Forest Hill Ore.—Messenger: The Maple Grove Co. had to suspend operations for a week on account of the freezing weather. Their gold became frozen and could not be thawed (?) out. Jas. Pearson is still manager and bids fair to outlive an Oscar Jones or Blus Lead Joe in this science of gravel mining.

South Fork Ore. are still pushing their prospect tunnel ahead, and expect to open up the rich ground south of the Old Extension by spring.

The quartz prospects on Kanaka side are looking well and a genuine boom is expected for next summer. Chas. Hegarty, of Moore's Flat, Nevada county, has struck it rich in the Old Plumbago at Minusota, and is reported to be taking the "stuff" out by the bucketful. All the other mines in this vicinity are at a standstill on account of the weather.

Siskiyou.

CRUSHER GOOD ORE.—Journal, Feb. 21: Some 34 tons were crushed at the Siskiyou mine, on

Humburg creek, lately, which yielded \$12 a ton, with four or five tons of the same being waste rock. It was run through the steam mill at the claim by Frank Hegler, who used fine steel wire screening. The owner of the claim, Thos. Orr, is well pleased with the prospect obtained, and intends starting work again when the weather settles and the ground dries out a little. There is a large amount of the same kind of quartz in the claim, easy to take out, and it is believed still better pay can be realized when the claim is more thoroughly developed.

Boyle & Co. are running a tunnel below their summit claim on Humburg creek, which is now in about 500 feet, and will continue its extension until able to resume work at the summit, where the ground is covered with about eight feet of packed snow.

Work has not yet been commenced on the proposed tunnel into the old Spencer mine on Humburg, nor the contract let, but as soon as the weather permits, the bids will be considered and arrangements perfected for operations, probably about the 1st of April. The facing for the tunnel has been blasted and a shed built over the opening to same.

The weather has been quite cold for a number of nights past. It froze up the water supply in small streams and ditches and stopped mining in the placer diggings where sluicing was carried on; but the weather having moderated this week, operations have been commenced again with energy.

The Schroeder quartz mill on top of Deadwood mountain, about nine miles south of Yreka, has been shut down, on account of snow preventing an opportunity of hauling wood to the mill, run by steam. The snow is about ten feet deep on an average, some places 15 feet, and others where the wind has a good sweep, not more than four feet. Although there is an abundance of growing timber in the vicinity, it is impossible to move it through such deep snow. This extra quantity of snow, however, will be good for the summer season in supplying water, and unless we have warm rains and hot weather during the next two months, the mill may not be started again before the 1st of May in crushing a very large quantity of ore on hand, with more to be taken out every day, as the snow does not interfere with the underground stoping to any great extent, as the steep sides afford good drainage to prevent much dripping inside of the tunnels.

The Greenhorn blue gravel mine paid \$332.15 last week, and seems to be gradually improving. There is more water in the shaft and drifts to contend with since the storms of the past week, but not more than the steam pump can handle with ease. The surface supply of water is still greater in proportion, and very desirable for successful use in the sluices for washing the gold from the sticky gravel. Fifteen men are employed, working two shifts.

Yolo.

CALIFORNIA COAL.—A fine specimen of bituminous coal, said to have been found in Glenda valley, Yolo county, was taken to Woodland. It was very bright and hard and was deposited on slate to the thickness of an eighth to a quarter of an inch. When ignited with a match it burned steadily, showing that in quantity it would be most valuable.

NEVADA.

Washoe District.

ON THE COMSTOCK.—The following official letters of operations during last week have been received:

Sierra Nevada.—The south lateral drift from the intermediate tunnel has been advanced 16 feet; total length, 448 feet; face in very hard porphyry. The joint east crosscut near the north line from the north drift, 1520 feet west of shaft, 900 level, has been advanced 23 feet; total length, 90 feet; face in heavy clay.

Union Shaft.—The joint east crosscut, near north line from the north drift 1520 feet west of shaft, 900 level, has been advanced 23 feet; total length, 90 feet; face in heavy clay.

Potosi.—The south drift on the 450 level has been advanced 22 feet; total length, 156 feet. The drift has turned about six degrees east of south to follow the quartz. The east side of the drift is in quartz averaging from \$8 to \$12 per ton. The east crosscut, 300 feet south of the north line, 750 level, is out 174 feet, having been advanced 28 feet; face in porphyry. Are making repairs on 350 level.

Bullion.—The west drift from this station, 820 level, Ward shaft, is out 565 feet from the shaft; face in porphyry.

Ward.—The west drift from the station, 820 level, Ward shaft, is out 565 feet from the shaft; face in porphyry.

Alpha.—Are repairing the old Alta shaft.

Con. California and Virginia.—1650 level.—From the drift run north from the foot of the npraise on the sill floor of this level at a point 178 feet in from its mouth, a northeast drift has been advanced 38 feet in porphyry carrying fine lines of quartz. The crosscut running east from the drift run north from east crosscut 1 from the north drift from the winze (down 52 feet) has been extended 17 feet; total length, 45 feet; face in porphyry and a quartz formation carrying a low assay value. In working upward near the mouth of the east crosscut we have extracted 19 carloads of ore, about 19 tons, assaying \$30.25 per ton. Have continued prospecting work in the vicinity of the winzes 20 feet down. The npraise commenced at the end of the southwest drift, the Rule drift, from this 1000 station of the Con. Virginia shaft, has been carried up 44 feet and connected with the Best & Belcher drift. From the southwest drift at a point 343 feet south from the shaft station an east crosscut has been advanced 8 feet in quartz and porphyry formation carrying a low assay value.

Ophir.—1465 level.—The drift running north from the crosscut running west from the main north drift on the sill floor of this level at a

point 124 feet south from winze station, has been extended 16 feet; total length, 158 feet; face in porphyry, clay and quartz of low assay value. An advance of 72 feet has been made during the week in reopening and repairing the old Central tunnel, making the total length of the drift reopened from its mouth 686 feet. Have continued (jointly with the Mexican Company) the work of making repairs to the main shaft.

Mexican.—1465 level.—The crosscut running west from the drift run south from the top of the npraise which was carried up 46 feet above the sill floor of this level, at a point 40 feet west from the main north drift and 100 feet north from the south line of the mine, has been extended during the week 26 feet; total length, 256 feet; face in porphyry carrying clay separations.

Best & Belcher.—900 level.—The east crosscut which is being run on the north boundary has been extended 15 feet, passing through porphyry and seams of clay; total length, 153 feet, 1000 level.—The northwest drift from our main north drift, 102 feet from our northern boundary, has been cleaned and repaired 50 feet; total length, 350 feet.

Gould & Curry.—200 level.—West crosscut 5 started in northwest drift, 432 feet from the main west drift, has been extended 19 feet; total length, 907 feet; face in hard porphyry.

Hale & Norcross.—1300 level.—We continue stoping out ore from the winze below this level, and extracted during the week four cars of ore assaying \$29.75 per ton per car sample, and 26 tons of ore, average assay per car sample \$19.43 per ton.

Chollar.—The raise for ventilation from the 100 level to the surface is up 28 feet. Extracted and sent to the mill the past week 65 tons and 1200 pounds of ore from the 100 level. Milled during the week 78 tons; on hand at the mill 160 tons 1908 pounds. Average of battery assays, \$20.30; average in car sample assays, \$20.67.

Alta.—Since last report we have advanced the npraise 16 feet; face in quartz and porphyry carrying low assays. We have extracted about 8 tons of ore from the south slope, the average value of which, according to car samples, is \$42 per ton.

Silver Star District.

Ban Wathaa.—Hawthorne Bulletin: The severe weather of the past few weeks has made prospecting impossible. Those working under ground are all pegging away, with cheerful prospects.

Pedraza & Grasmis have about a carload of ore ready for shipment to the Hawthorne arrastra.

Frank Smith has a location on which the ledge crops out for the entire length of the claim. All the quartz carries gold, and samples have been found which show coarse gold in the quartz. As soon as the weather moderates Frank will begin sinking.

ARIZONA.

A NEW MILL.—Prescott Journal-Miner: The new 10-stamp mill at White Hills will be ready to start up now within a few days. The present mill consists of only 10 stamps, but 40 more will be added soon. This motive power for the machinery will be a gasoline engine, on account of the scarcity of fuel and water. Some idea of the richness of the property may be had from the fact that it is silver, and can be made to pay at the present price of that metal. The company has shipped carload after carload of ore which netted them \$15,000 each. A 60-stamp mill on a silver mine, in these days of low prices of silver, is a rarity. Chlorides are at work on other claims in the camp, and are taking out the richest ore ever extracted in that district.

RICH DISCOVERY.—Yuma Times: A letter from Harrisburg states that John Bullett has made a very rich gold discovery in the vicinity of Copper Camp, northwest of Vulture. The ore is as valuable as any found in the Harqua Hala. A party of Virginia City capitalists are on the ground investigating the property, with a view of purchasing. It is said that \$200,000 has been offered for the claim. The party is supposed to represent John Mackay, of bonanza fame.

LUMBER FROM ARAOAN.—Enterprise: A vessel loaded with 75,000 feet of lumber lately arrived at Gnamayas for the Bisbee Copper Co. Another vessel load of 441,000 feet will discharge in a few days, and is going into Bisbee as fast as convenient to hand.

OREGON.

Too MUCH SNOW.—Jacksonville Times, Feb. 22: The miners of Elliott creek have departed for the season on account of the snow, which is four feet deep.

A great deal of snow lies on the higher hills, which ensures a protracted run to those placer miners whose ditches head there.

It is reported that Alex Orme, the well-known prospector, has made another big strike in quartz in Foothills creek district, and has already taken out several thousand dollars.

The Annie mine in Bohemia district has produced many thousands of dollars during the past few years and is now turning out a ton of concentrates per day. There will be 150 tons ready for shipment when the snow blockade is raised.

A MALHEUR MINE.—Baker City Democrat: A porphyry formation that has attracted more or less attention from miners at Malheur City for several years past, but upon which little development work has been done on account of the low-grade character of the ore, is now in the hands of those who intend to investigate. Lately Mr. C. O. Barus of Ogden secured a bond on the property, and he in turn has rehired. The ledge or formation is fully 16 feet wide, and assays of the ore give a value of from \$6 to \$7 per ton. Arrangements are now under headway to commence sinking operations as soon as the weather will permit.

Electricity.

Heating by Electricity.

Mr. Campbell Scott, in a paper on this subject, remarks that such a quantity of electricity is necessary in operating electrical railway systems that the loss of a small portion of it is but a minor item to electrical railway managers, and from the start they showed an eagerness to adopt any method possessing so many conveniences as electricity for heating their cars and making them comfortable and attractive to their passengers. At the present time at least one-fourth of the electric railways of this country have their cars heated by electricity, and from what I can learn a very satisfactory result is accomplished at but a very light cost.

The method employed is very simple, which is as follows: Underneath the seat of the cars, in three or four locations therein, one of these electric heaters is placed and a small portion of the electric current used in operating the motors of the cars is diverted through the heaters. The general method employed in this new form of heating device for heating cars is as follows: The frame of the heater is generally about 8 or 10 inches high, about 6 inches thick and 3 feet long. A special "plaster" is made, looking something like porcelain when hard, in which very fine, specially prepared wires are embedded from one end to the other in zigzag fashion. The entire surface of the plaster is in this way embedded with the resistance wire, with the two ends of the wire protruding at one end, while in some cases several plates of plaster with these wires embedded therein are employed, after which the plaster substance is applied to the exposed surface of the wire, thoroughly encasing them therein. After this has been done, the whole substance is cooked until it resembles the hardest porcelain, with enamel finish. The exterior metal case, with legs underneath, is placed around this, and with sundry finishing touches we have an electric stove or heater.

It must be understood first, before I describe the method by which the heat is produced through the above mentioned medium, that electricity always flows in what is technically known as a "circuit," i. e., the electric current after being developed from a generating source, must return to the same source. In other words, electricity will not flow or operate unless this circuit is maintained, for as soon as the circuit is broken the flow ceases. Any metal will conduct electricity to a greater or less extent, but some metals possess the capacity of conveying a given amount of electric current with a far less loss than others. When we attempt to convey electricity through a bad conductor, we seem to "cramp" the electric current, and it seems that a great friction takes place therein, which causes heat. In other words, when an electrical conductor retards the passage of the current the conductor is heated and the greater the resistance offered by the conductor to the passage of the current the greater is the intensity of the heat produced. Copper is considered one of the best conductors and offers but little resistance to the flow of the electric current, while such metals as platinum, German silver, etc., are termed poor conductors, and on this account offer great resistance to the current's passage, and consequently in them the current produces heat. In electric heaters above described, very poor results would be obtained if the wires employed therein were composed of copper, which offers a very low resistance to the passage of the current, while the best results are obtained from fine, specially prepared wire, which offers a very high resistance to the current's passage and consequently causes the production of heat. This special resistance wire being embedded in the plaster is practically protected from the

outside air, and a very high heat is produced, which is conveyed to the enamel, the intensity of heat being governed by the quantity of resistance wire employed, also by the quantity of current which flows through it. For several years a number of inventors have been at work endeavoring to so perfect this system of heating that it will be available for many of the commercial and domestic uses where small heated surfaces are necessary.—American Gas Light Journal.

Light Without Heat.

To the speculative mind none of the possible future applications of electricity is more attractive and none so full of immediate interest, as the possibility that seems almost within our grasp of obtaining light without heat, or making the light waves without the heat waves that have thus far always been at the same time the companion and the burden of all artificial light, says the *Electrical World*. The time is ripe, and the exact science of the day seems all but ready and willing to give the analysts of two great problems, the answer to either of which would stand the crowning achievement of a century of progress in the application of nature's secrets to the requirements of daily life. One of these—the navigation of the air—seems to be a mechanical problem only; while the other—the production of light without heat—we may confidently say is only a question of properly handling the electric current. Nature presents us with beautiful examples of both solutions, but guards jealously the key to her method of operation, by which well-known forces are made to do the apparently impossible thing, and it is equally beyond our science to-day to explain how the bird soars aloft on motionless wings and how the glow worm emits a gleam of light without a ray of heat. But they do it, and the many imitators of the bird will soon be equaled in number by those who are chasing the fire-fly's secret.

What nature does with nature's forces man should and doubtless will be able to do with a full knowledge of those forces and a better comprehension of the methods by which nature applies them. Who shall say which is the more difficult accomplishment, the production of an artificial ruby or the production of an artificial light without heat? There is no certainty, indeed, that the latter will come from the hands of the chemist first. We are not only too prone to hastily write that down as the impossible which is simply not yet done and our last achievement as the most difficult of all accomplishments. Let us not, however, forget that the chemist has striven for more than a century to make the artificial stone with commendable success and the mechanic has striven a century to navigate the air, while the electrical engineer has wrested but a comparatively short time with the problem of light without heat and has already shown that the solution, far from being impossible on the lines of his attack, is, indeed, a reasonable expectation of another decade of electrical advance.

Complimentary Samples.

Persons receiving this paper marked, are requested to examine its contents, terms of subscription, and give it their own patronage, and, as far as practicable, aid in circulating the journal and making its value more widely known to others, and extending its influence in the cause it faithfully serves. Subscription rate, \$3 a year. Extra copies mailed for 10 cents, if ordered soon enough. If already a subscriber please show the paper to others.

REMOVAL.

The Clayton Air Compressor Works have removed their Offices and Salesrooms from 43 Dey Street to Second Floor of the HAVEMEYER BUILDING, Cortlandt, Dey and Church Streets.

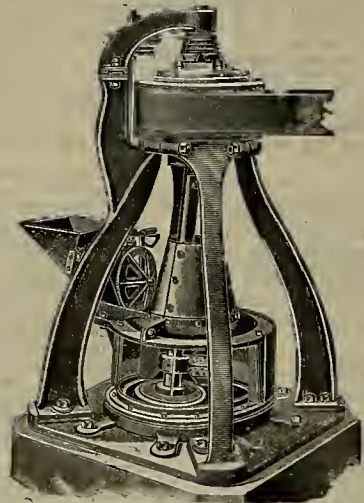
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CEMENT,
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PHOSPHATE
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Substances.



Will work either wet or dry, and deliver a finished product. Capacity, 3 to 4 tons per hour on Phosphate Rock, 1½ to 2 tons per hour on Portland Cement, Quartz or Ores, depending on hardness of material to be pulverized and fineness of product. Grinds from 30 to 250 Mesh with equal facility.

NO JOURNALS IN GRINDING CHAMBER. BALL RIGID ON SHAFT HAVING DIRECT POSITIVE ACTION ON MATERIAL. MINIMUM POWER PRODUCES MAXIMUM AMOUNT OF PRODUCT. IT IS ABSOLUTELY GUARANTEED IN EVERY RESPECT, BOTH AS TO CONSTRUCTION AND CAPACITY. FIRST COST, WEAR, AND OPERATING EXPENSE MUCH LESS THAN STAMP MILLS. LARGE NUMBER OF MILLS IN USE ON DIFFERENT MATERIALS WITH POSITIVE SUCCESS IN EVERY INSTANCE.

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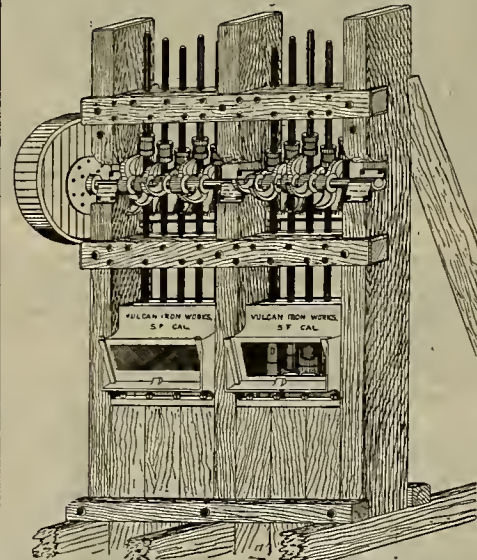
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Special attention is called to this new feature in the drainage of mines and raising water generally, by which a continuous discharge of water is produced on the up stroke and down stroke, instead of on the down stroke only, which is effected by very much less than one-half the weight of machinery now in use.

When the ordinary pump becomes too small for the work it can be replaced by the new one, using the same rod and column, and doubling the discharge of water, a most important advantage in small shafts where there is not room for a larger pump.

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Market Reports.

The Markets.

SAN FRANCISCO, March 1, 1894.

The course of silver during the week has been downward, the lowest point being touched last Friday, when the New York price was 59 1/2. There has been a somewhat better feeling since, and prices have slightly improved. The New York price today is 60c; London, 27 1/2d.

New York Prices.

NEW YORK, March 1.—Following are the closing prices for the week:

Silver in—			
Thursday	Friday	Saturday	Sunday
London, N. Y. Copper, Lead, Tin.			
27 1/2	59 1/2	9 1/2	3 in 19 00
27 1/2	60	9 1/2	3 in 19 00
27 1/2	60 1/2	9 1/2	3 in 19 00
27 1/2	60 1/2	9 1/2	3 in 18 75
27 1/2	60 1/2	9 1/2	3 in 18 75

San Francisco Metal and Coal Market.

ANTIMONY.				QUICKSILVER.			
For D.	@	13		Home trade, pr.			
BONAX.				Blank.....	30	@	--
Refined, in car lots	@	71		STEEL.			
For D.	@	71		English, D.	--	30	
Concentrated, in car lots	@	71		Can.	--	16	
All grades jobbing at advance.				B. & C.	8	@	84
COPPER.				Pick & Hammer.	6	@	10
Bell.....	23	@	--	Wachusett.....	4	@	8
Shilling.....	23	@	--	Toe Oak.....	4	@	21
Ingot, jobbing.....	20	@	--	TIN.			
Do, wholesale.....	15	@	26	Spot, D.	21	@	22
IRON.				OCAL.			
Bar, base.....	@	21		SPOT FROM YARD—PER TON.			
Norway, base.....	@	21		Wellington.....	8	@	80
PIG IRON.				Ore.....	8	@	50
Spot.....	@	21		Naumoo.....	8	@	50
Ellington, 1/2 ton.....	22	@	50	Olin.....	8	@	50
Clayton.....	22	@	50	Seattle.....	8	@	50
Am. B. & N., 1/2 ton.....	22	@	50	Coos Bay.....	9	@	50
Shuttle No. 1.....	22	@	50	Cannel.....	9	@	50
Puget Sound.....	22	@	50	Egg, hard.....	12	@	50
Long Lake White.....	22	@	50	Walsend.....	7	@	25
Langdon.....	22	@	50	Booth Split.....	7	@	50
Garbarric.....	22	@	50	Brymo.....	8	@	50
Barrow.....	22	@	50	West Hartley.....	7	@	50
Cargodoc.....	22	@	50	TO LOAD—PER TON.			
LEAD.				Australian.....	6	@	50
Pig.....	@	41		Liverpool Steam.....	6	@	50
Bar.....	@	41		Booth Split.....	7	@	50
Sheet.....	@	41		Oardiff.....	7	@	50
Pipe.....	@	41		Lehigh Lump.....	10	@	50
Drops, sizes smaller than				Cumberland.....	8	@	50
B, 1/2 bag of 25 lbs.....	1	@	75	Egg, hard.....	9	@	50
Do, B and larger sizes	2	@	00	West Hartley.....	7	@	50
9 bag of 25 lbs.....	2	@	00	COKE.			
Brk. Balls and Chilled	2	@	00	Do, spot, in bulk.....	35	@	10
do, 1/2 bag of 25 lbs.....	2	@	00	Do, in sacks.....	35	@	10
				Cumberland.....	9	@	50

Mining Share Market.

SAN FRANCISCO, March 1, 1894.

Last Saturday the Comstock shares closed weak, with sales of Con. California at as low as \$2.75 and Ophir at \$1.85, but Monday morning the whole list opened with a steadier tone, and afterward prices again took the up grade. Later the market acted as if it had been freed of a large number of weak margin accounts, and had a big accumulation of shares.

Tuesday there were further advances. Brokers bought freely. The stocks most in demand were Con. California, Ophir and Mexican, of the north-end group of mines, Potosi, Bullion and Chollar, of the middle group, and Crown Point, Belcher and Yellow Jacket, at Gold Hill. Relieved as it had been by recent heavy sales of weak margin stocks, and with a large short interest involved, the market readily responded to the sudden demand, and during the morning Con. California sold at as high as \$3.55, Ophir \$2.30, Mexican \$1.50, Potosi \$1.10, Bullion 40 cents, Belcher 85 cents, Crown Point 65 cents and Yellow Jacket 85 cents, with the other stocks higher in proportion.

Wednesday there was considerable activity in the market. After a strong closing last night the leading stocks opened at still higher prices in the Pacific boardroom this morning. At the first session of the San Francisco Board there was a sudden and unexpected break which could not be explained otherwise than that it was the result of the whims of speculators. Immediately afterward the leading stocks had a sharp advance. These erratic changes are evidently caused by the trade of the general public, who are now entering the market freely, and are easily scared or encouraged by the fluctuations.

Board Sales of Mining Stocks.

S. F. Stock Board.

THURSDAY, March 1, 1894.

9:30 A. M. SESSION.			
100 Andes,	40c	450 Mexican,	1.40
450 Belcher,	80c	350 Ophir,	2.30
100 Best & Belcher,	1.70	100 Potosi,	2.25
400 Bullion,	40c	300 Overman,	20c
100 Crown Point,	35c	450 Sierra Nevada,	1.20
300 Con. Cal. & Va.,	3.30	250 Union,	85c
300 G. & O.,	75c	400 Yellow Jacket,	75c
2:30 P. M. SESSION.			
100 Andes,	45c	50 G. & O.,	75c
250 Belcher,	80c	100 H. & N.,	80c
400 Best & Belcher,	1.70	400 H. & N.,	80c
400 Bullion,	40c	300 Mexican,	1.50
100 Crown Point,	35c	300 Overman,	20c
300 Con. Cal. & Va.,	3.30	450 Sierra Nevada,	1.20
300 G. & O.,	75c	400 Union,	85c
		400 Yellow Jacket,	75c

—M. Cohn, Charles Kelley and other leading Carson merchants have combined and propose to put on freight teams between Carson and Sacramento. They say the steamers will land freight in Sacramento from San Francisco for \$2 a ton, and with the assistance of steam wagons, they can haul seven or eight freighters to the foot of the Kingsbury grade, via Placerville, then teaming to Carson can land freight there for one cent a pound. It is proposed to erect a big commission and storehouse, which will be stocked to draw on during the winter, when the roads are impassable.

List of U. S. Patents for Pacific Coast Inventors.

Reported by De & Co., Pioneer Patent Solicitor for Pacific Coast.

FOR THE WEEK ENDING FEB. 20, 1894.

515,285.—COLD STORAGE.—Burnham & Meyers, S. F.	515,072.—FRUIT BASKET.—T. Cogswell, San Diego, Cal.
515,116.—GRIP OPENER.—W. F. Courtney, Oakland, Cal.	515,117.—COAL BUCKET.—Curtis & Isaacs, S. F.
515,283.—SYNTHETIC.—C. D. Harris, Stockton, Cal.	515,050.—CARBIDE.—G. E. Hoyt, S. F.
515,143.—LEACHING ORE.—Janio & Merrill, S. F.	514,946.—INSECT TRAP.—L. M. Long, Porterville, Cal.
515,162.—LIFTING FORK.—G. M. Parsons, Virginia, Nev.	515,014.—MOLD.—E. L. Ransome, Oakland, Cal.
515,016.—FIREPROOF FLOORING.—E. L. Ransome, Oakland, Cal.	515,016.—CONCRETE PIPE.—E. L. Ransome, Oakland, Cal.
515,017.—SHARING LIME.—E. L. Ransome, Oakland, Cal.	515,108.—CLAMP NAIL.—H. O. Ransome, S. F.
515,131.—CHAMBERS, ETC.—J. D. Rush, San Diego, Cal.	515,023.—SWIVEL.—F. Solathe, Santa Paula, Cal.
515,136.—CAN-BODY MACHINE.—C. M. Symonds, S. F.	515,032.—FLOWER POT.—W. L. Vestal, San Bernardino, Cal.
514,978.—STRIKING PIANOS.—C. S. Weber, San Jose, Cal.	514,978.—PLOW.—J. H. Wilks, Douglas, Or.

NOTE.—Copies of U. S. and Foreign patents furnished by Dewey & Co. in the shortest time possible (by mail or telegraphic order). American and Foreign patents obtained, and general patent business for Pacific Coast inventors transacted with perfect security, at reasonable rates, and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey & Co.'s Scientific Press U. S. and Foreign Patent Agency, the following are worthy of special mention:

CAN BODY MAKING MACHINE.—Clarence M. Symonds, San Francisco, Cal. No. 515,136. Dated Feb. 20, 1894. The object of this invention is to provide an apparatus into which the sheets of tin are delivered and by successive dies are first bent into a semi-circular shape, and then have interlocking hooks formed upon their edges, after which they are still further bent until these hooks interlock and are closed together to form a complete can body, after which the completed body is moved outwardly and passed through a soldering bath after having the acid applied to the edges, so as to form the can body from the sheet of tin in a single continuous operation, the object being effected by means of an interior reciprocating horn having various portions of its length suitably formed to carry out, in conjunction with the dies and other parts, the various parts of the operation.

AUTOMATIC GRIP OPENER.—William F. Courtney, assignor of one-half in Albert Brown, Oakland, Cal. No. 515,115. Dated Feb. 20, 1894. The object of this invention is to provide a mechanism whereby the grip employed upon cable railway cars is automatically released at the point where the car crosses another cable line, and where it is necessary to temporarily let go of the cable by which the car is propelled. It consists of a vertical detent, a pitman connected with and adapted to operate the detent, a lever and safety bar, a pivoted link connecting these parts with the detent operating pitman, and a fixed anti-frictional incline forming contact with the lower end of the safety bar so as to force it upward, disengage the detent, together with a spring-actuated catch in holding the parts in the elevated position, and a foot rod for returning them to their normal position.

COAL HANDLING BOCKET.—William G. Curtis and John B. Isaacs, San Francisco, No. 515,117. Dated February 20, 1894. This invention relates to improvements in buckets, such as are employed for hoisting coal, dredging and other similar purposes. It consists of a bucket formed in segmental sections having coovering suspending rods coconnected with the outer and upper angles of the bucket, a shaft above the lower angles and coovering connections therefrom to the inner angles, together with independent pulleys loosely journaled on the shaft, and a single pulley mounted on a pivot which unites the coovering suspending rods, together with a shackle of rope connecting with the upper ends of the rods and a rope or chain around the pulleys so that the hoisting and closing and opening and discharging of the bucket may be performed with a simple operation and two ropes.

CHAMBER OR OTHER LIQUID RECEIVING VESSEL.—Jacob D. Rush, San Diego, No. 515,131. February 20, 1894. This consists of a closed vessel having an inclined ledge below the top, an inclined receiving plate supported upon the ledge with an encircling rim to confine and direct any liquid deposited therein, and an opening in the lower side in proximity with the adjacent wall of the vessel with a flange projecting from the wall directly under the opening to direct the flow down the side of the vessel.

Coast Industrial Notes.

—A portable sawmill is being put in above Elk City, Or. Its capacity is 400 feet a day, and it will fill some alder and cedar contracts already made with San Francisco.

—Horses which formerly sold for \$50 and \$60 in Harney valley (Or.) are now sold for \$25. Recently a band were sold for \$10 a head to a man without money, to be paid for in two years.

—An Oregon speculator recently purchased 6400 acres of valuable timber land in Nebahem valley. The price paid for it is stated at \$72,000. This is the largest land sale for some time.

—Work on the Esquimalt fortifications near Victoria, B. C., will begin at an early date. Arrangements are now being made for a number of teams for hauling dirt and rock on the excavations.

—The Canadian Pacific has let a contract

MINING SHAREHOLDERS' DIRECTORY.

COMPILED EVERY THURSDAY FROM ADVERTISEMENTS IN THE MINING AND SCIENTIFIC PRESS AND OTHER S. F. JOURNALS.

COMPANY AND LOCATION.		ASSESSMENTS.		SECRETARY.	
		No. AMT. LEVIED.	DELINQ. Y. AND SALE.		
Alpha Cons M & M Co, Nev.	12	10c	Jan 18, Feb 21, Mar 20	Chas E Elliot, Nevada Block	
Alta S M Co, Nevada	45	10c	Jan 25, Feb 23, March 21	J E Jacobus, Nevada Block	
Bullion M Co, Nev.	49	15c	Jan 23, Feb 28, Mar 20	R R Grayson, 331 Pine	
Condon G M Co, Cal.	1	60c	Jan 11, Feb 16, Mar 13	Thos Lynch, 23 Montgomery	
East Best & Belcher S M Co, Nev.	4	30c	Jan 25, Feb 26, Mar 13	O U Mason, 224 Montgomery	
East Sierra Nevada M Co, Nevada	3	80c	Jan 10, March 23, April 15	Geo E Bidner, 310 Pine	
Eclipse M Co, California	7	20c	Feb 8, Mar 12, Apr 3	Otto tam Staden, 216 Bush	
El Leopoldo G & S M Co, Mex.	5	10c	Jan 25, Mar 1, Apr 3	Jaber Howes, 214 Pine	
Evening Star M Co, Cal.	12	15c	Jan 11, Feb 23, Mar 16	J J Scoville, 20 Sansome	
Gold & Curry S M Co, Nev.	35	30c	Jan 10, Feb 10, Mar 7	A K Durbow, Nevada Block	
Gray Eagle M Co, Cal.	19	50c	Jan 24, Feb 28, Mar 19	R L Thomas, 418 California	
Iowa M Co, Nev.	19	50c	Feb 6, Mar 12, April 2	R E Kelly, Nevada Block	
Justice M Co, Nevada	29	25c	Jan 15, Feb 24, Mar 31	K L Ross, Sup Court Bldg	
Marion White Nevada	15	10c	Jan 15, Feb 19, Mar 14	A K Durbow, Nevada Block	
Occidental Cons M Co, Nev.	1	25c	Jan 17, Feb 23, Mar 12	R R Grayson, 331 Pine	
Osborn Hill M Co, Cal.	1	60c	Jan 25, Mar 5, Mar 26	Aug Waterman, Nev Block	
Pearl M Co, Ariz.	21	60c	Jan 26, Mar 6, Mar 26	Aug Waterman, Nev Block	
Pine Hill G & S M Co, Nevada	8	25c	Jan 26, Mar 7, Mar 27	Chas A Hare, Pier 5, Steamer St	
Seaton G M Co, Cal.	13	10c	Feb 5, March 9, March 29	E B Holmes, Nevada Block	
Seg Belcher & Mides Cons M Co, Nevada	108	25c	Jan 17, Feb 20, Mar 12	E B Parker, Nevada Block	
Serra Nevada S M Co, Nev.	13	50c	Feb 16, Mar 23, Apr 10	K J Willats, Flood Bldg	

COMPANY AND LOCATION.		MEETINGS.		SECRETARY AND OFFICE IN S. F.		DATE.	
Delite M Co	Annual	O F Hunt, 14 Sansome	Mar 14				
Hale & Norcross S M Co, Nevada	Annual	A B Thompson, Nevada Block	Mar 14				
Jalia Cons M Co, Nevada	Special	Stadford, Jr, Nevada Block	Mar 9				
Potosi M Co, Nevada	Annual	Chas E Elliot, Nevada Block	Mar 14				
Pyramid M & M Co	Annual	Chas A Hare, 39 R E Ave	Mar 10				
South Eureka M Co	Annual	A Halsey, 328 Montgomery	Mar 7				

for building 250 miles of railroad between Nelson, B. C., and a point near Calgary. The proposed route is the much-talked-of Crows' Nest pass and Tobacco plains.

—Artesian water has been struck in Cochise county, A. T., by a man named McRae. The flow is 21,000 gallons in 24 hours. In addition to the value of the water, McRae will get \$2000 reward offered by the Supervisors for a running well not more than 500 feet deep.

—At the Sisson hatchery no less than 8,500,000 young fish have been hatched this season. About 6,500,000 still remain on hand, and will be kept until they are a year old. Trout hatching will soon commence, and it is intended to handle this season about 2,500,000 eggs.

—A fire at Kelso, B. C., burned nearly everything on Front street, between Third and Fourth. On the north side of the street every building is burned. The Custom House was destroyed, but the records were saved. Several buildings were pulled down, and others were blown up with dynamite.

—During the year an average of 1,000,000 feet of lumber a month has been put out by Pasadena lumber yards for use there. This gives 12,000,000 feet for the whole year (10 December 31, 1893), which at an average price of \$20 per 1000 gives \$240,000 as the total expenditure for building material of this kind during 1893.

—The Golden Rule Bazar, the well-known establishment of Davis Brothers, at 718 to 722 Market street, is a mass of ruins. Fire destroyed it Monday night. The loss, which is nearly total in the bazar, is estimated by the firm at about \$250,000, covered by an insurance of \$176,000 in nearly all the local agencies. The building belonged to the Blythe estate, and was insured for about \$20,000. It is a total loss. The cause of the fire is unknown, but that it had its origin on the Geary street side of the building there is no doubt.

Cal. Debris Commission Notices.

THE CALIFORNIA DEBRIS COMMISSION having received petitions to mine by the hydraulic process from Daniel W. Albert in the Union mine, near Brownsville, Yuba Co., to deposit tailings behind dam in dry ravine; from Tautouo Oampo in the Oampo mine, near Brownsville, Yuba Co., to deposit tailings in old hydraulic pit; from J. M. Wetmore in the Herring Ravine mine, near Brownville, Yuba Co., to deposit tailings behind a dam; from W. W. A. Lemmon in the Ooruit Ravine mine, near Brownsville, Yuba Co., to deposit tailings behind a dam in the Letson ravine; from James Gordon in the Motor mine, near Brownsville, Yuba Co., to deposit tailings in old hydraulic pit; from Crane Bros. in their mine at Sharon Valley, near Brownsville, Yuba Co., to deposit tailings in old hydraulic pit; from the Spring Gulch Mining Co. in the Spring Gulch mine, near San Andreas, Calaveras Co., to deposit tailings behind dam in dry ravine; from Joseph Snow et al. in Snow Bros' mine, near Newtown, El Dorado Co., to deposit tailings behind a dam in Welch creek; and from H. B. Havens in the Green Meadow mine, near Glennco, Calaveras Co., to deposit tailings behind dam in dry ravine; give notice that a meeting will be held at Room No. 32, Flood Building, San Francisco, Cal., March 6th, 1894, at 1:30 P. M.

Assessment Notices.

GOULD & CURRY SILVER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Virginia, Storey County, Nevada. Notice is hereby given that at a meeting of the Board of Trustees, held on the 31st day of January, 1894, an assessment (No. 73) of Fifteen (15) Cents per share was levied upon the capital stock of the corporation, payable immediately in United States Gold coin to the Secretary, at the office of the Company, Room 80, Nevada Block, No. 309 Montgomery Street, San Francisco, California. Any stock upon which this assessment shall remain unpaid on the 31st day of March, 1894, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on THURSDAY, the 29th day of March, 1894, to pay the delinquent assessment, together with the costs of advertising and expenses of sale. By order of the Board of Trustees, ALFRED K. DURBROW, Secretary. Office—Room 80, Nevada Block, No. 309 Montgomery Street, San Francisco, California.

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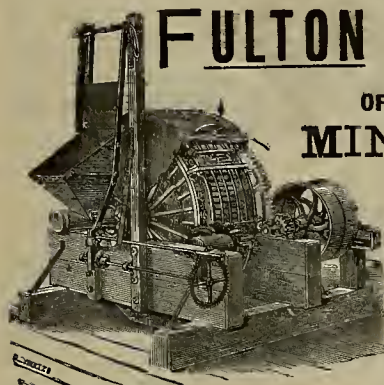
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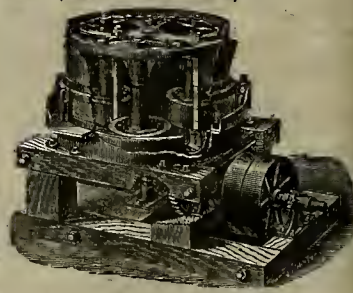
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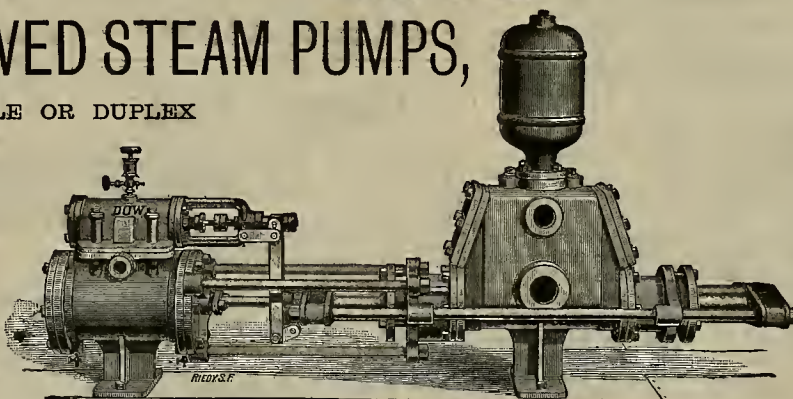
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VOLUME LXVIII.
Number 10.

SAN FRANCISCO, SATURDAY, MARCH 10, 1894.

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Union Iron Frame Battery.

The stamp battery is the most familiar mechanical appliance for crushing ores. From the crude and clumsy device of earlier times, it has been so improved and perfected that it still holds its own against other methods. Stamps can be depended upon for effective and reliable work. They are so simple that but little skill is required to operate them, as well as keep them in repair, having the advantage that if anything goes wrong with one, it does not stop the entire mill.

One objection urged against the stamp battery is the expense incurred in erection, on account of the millwright work necessary in framing and construction; requiring skilled mechanics, who, in many instances have to be sent long distances, involving much time and expense, even where timber is available for this purpose. In localities where suitable timber cannot be obtained, it has to be freighted a long way; this, in connection with the cost of framing and setting up, makes a very expensive mill. It is little wonder, therefore, that a substitute for the ordinary wooden frame battery has been so eagerly sought for.

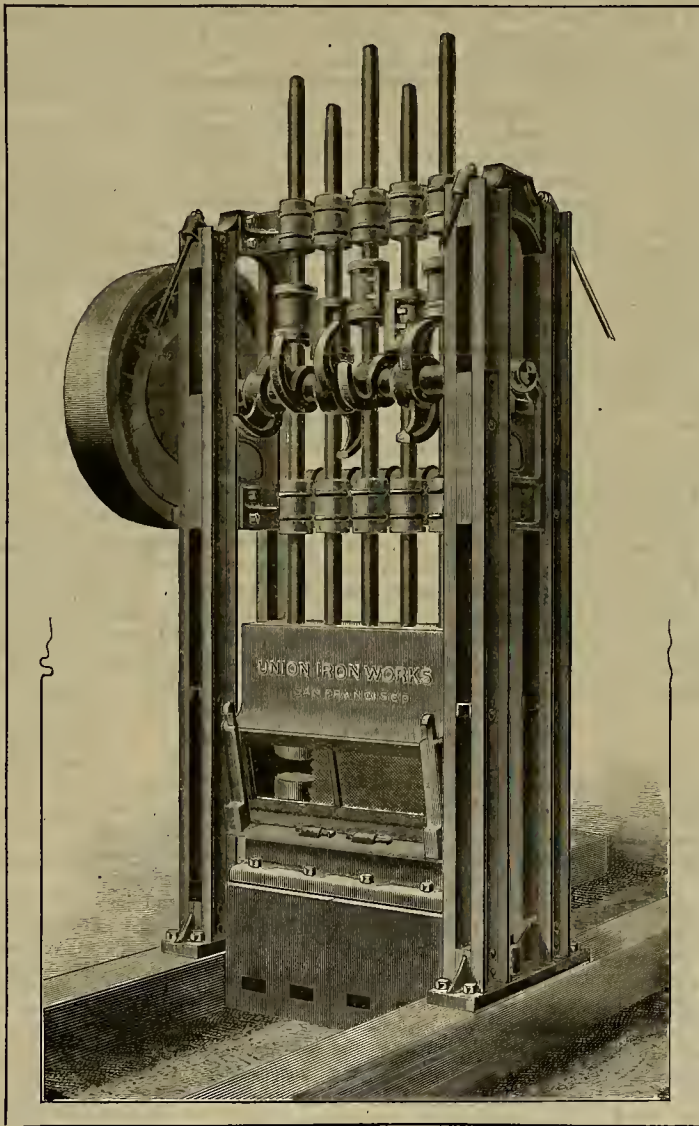
The Union iron frame battery, herewith illustrated, is designed to obviate all such objections and meet fully the demand for a cheap and portable mill complete in itself, that can be put up without skilled labor—conditions of importance in many mining districts—and that can be depended upon for the best results. In general construction, as will be seen, it is the same as the most improved form of battery intended for woodwork.

The mortar used in this battery is the latest improved standard mortar, being securely fastened to the mortar block by holding-down bolts. The columns are made of channel iron, to which the top bridge-tree, cam-shaft boxes and base piece are securely bolted or riveted, combining strength with durability and neatness of design. The mortar block, the upper section of which is shown in cut, is the same as that required for any other style of battery. It is ordinarily eight to ten feet in length and made of two-inch plank, spiked and bolted together. This makes a good block, and, in localities difficult of access, can be easily transported on either mule-hack or otherwise. When made in sections, the mortar is cut into six pieces or more, of full packing weight, and provided with reamed bolts for fastening together when in place. The mill being complete, no millwright or other skilled labor is necessary in setting up. The pieces are so marked that any one with ordinary intelligence can easily and quickly put it up in good running order. A single battery of five stamps makes a perfect mill. When larger capacity is wanted, any additional number may be added, making a 10, 20 or 40-stamp mill as desired. As may be mentioned, the Union Iron Works has furnished 100 stamps of this design to the famous Compania Huanchaca de Bolivia.

Although adapted to any locality, they have come more especially into use in Mexico, Central and South America, where facilities for securing available timber and having it framed are limited.

THE California Debris Commission last Tuesday granted the following permits to mine by the hydraulic process:

Crane brothers, mine at Sharon valley; J. M. Wetmore, Herring Ravine mine; Fausteno Campo, Campo mine; D. W. Albert, Union mine, and James Gordon, Motor mine. Application for permits have been made to the Commission by the owners of Spring Gulch mine, near San Andreas; Green Meadow mine, near Glencoe, Calaveras county; the Grub Flat, Badger Hill and Indian Hill mines, in Plumas county; the Spanish Hill Hydraulic,



A MODERN IRON FRAME BATTERY.

Spanish Hill Gravel, near Placerville; and the other mines in that neighborhood. Restraining works have been erected in the Kate Hayes mine, a large property at French Corral, and the mine is now ready for inspection by the Commission. This is one of the largest mines that has so far come under the authority of the Commission.

AUSTIN, Lander county, Nevada, now has about 400 people. Its bullion output does not exceed \$10,000 monthly. It once had 10,000 people. There is a vast amount of low-grade ore in the mines of that district, and if silver is ever placed on a parity with gold Austin is likely to again become a flourishing town.

The Miners' Wage Controversy.

The letter of a recent correspondent in the PRESS has started a discussion throughout the State as to miners' wages and their reasonableness. It seems to us that the question scarcely admits of argument, so far as California is concerned. The scale of wages in this State—\$2 50 to \$3 for underground work—is low enough, considering the nature and risk of the work, and the experience and intelligence required. As long as gold mines are generally prosperous, no uniform effort on the part of owners to reduce wages is to be expected, even when there are many unemployed miners flocking in from the silver States. It is true that in special instances, advantage will be taken of circumstances, or circumstances will require that the scale be reduced; but there will be no general movement, for the sufficient reason that labor of the character necessary to the best development of the mines cannot be secured for less. Besides this, the equities of the situation demand that the present standard be maintained, and herein is exerted no small influence upon owners, no matter what may be said or thought to the contrary.

The situation in the silver States is different. There is at present a strike in Cripple Creek—a gold camp, by the way—arising out of the demand of the miners' union for \$3 for eight hours work. In the nature of things, the miners have the losing end of the fight. On the Comstock wages are \$4 per day, and, owing to the strong stand made by the miners' union, are likely to remain at that figure for some time. The circumstances are exceptional. The number of men employed is new comparatively small. In the Coeur d'Alenes the strike was a failure, and employers pay what they please. But the mines are not running at all now, owing to the low prices of lead and silver. In Montana and elsewhere it seems to us that the tendency is toward the California basis, and it seems likely to take a decided turn in that direction before very long.

A CORRESPONDENT of a Grass Valley paper takes occasion to attack the State Miners' Association in the following, among other things: "Secretary Ralston, while not in any sense a 'mining man,' understands the work of fixing things so as to keep in his salaried office, and Jacob H. Neff stands by his friends through thick and thin. It is, indeed, a happy family, and your quartz miners ought to be ashamed for not putting their hands in their pockets and helping keep up the parade." Mr. Ralston makes a complete reply to this and other

criticisms in a recent issue of the *Tidings*, and shows that the Miners' Association has for its purpose the advancement of the interests of all branches of mining. Large attention has been paid to hydraulic mining, because this interest was suffering most severely. But the bill recently prepared by the legislative committee of the association and just introduced by Congressman Newlands, discloses that quartz-mining interests are looked after with equal care and diligence.

THE big push plow which was in the wreck near Truckee during the snow blockade has been hurned. This was found necessary in order to remove the disabled engine.

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Our latest forms go to press on Thursday evening.

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San Francisco, March 10, 1894.

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THE miners' strike at Cripple Creek is said to have been partly won by the miners. A dispatch from that place March 6th says: The Gold King, Strong, Granite and Washing mines have resumed operations on eight-hour shifts. The miners are sanguine of compelling every mine in the camp to adopt the eight-hour law. The Anna and Lee will commence work in a few days on the miners' terms. This news seems surprising, for the miners certainly had odds very strongly against them.

SENATOR STEWART is on deck in Congress with the free-silver cause. He has indicated his purpose to renew the fight. The Senator's persistence deserves admiration. Besides, it will be beneficial. The sentiment of the East appears to have been materially modified in relation to silver, and there can be no doubt that the single-standard advocates in Congress will soon be more ready to give greater consideration to the white metal. We think the signs of the times indicate an organized effort to secure the larger use of silver. Just what steps will be taken it is not possible to say.

A WASHINGTON CORRESPONDENT says that Oregon, Washington and Idaho, together with several other Western States, may receive federal aid to establish schools of mines. A bill for that purpose passed the Senate early in the session, but as it gave to each State a considerable quantity of land, it ran up against a snag in the public land committee of the House. That committee returned an adverse report February 8th, the result being the indefinite postponement of the measure. The friends of the bill in the Senate, however, were not content that it should meet with such a premature death, and, by individual solicitation on the floor of the House, succeeded in obtaining a reconsideration. The bill now takes its place on the calendar, and, as nine Western States are interested in it, strong efforts will be made to secure its passage.

JUDGE HAWLEY, in the United States Circuit Court of Nevada, decided in favor of the Sutor Tunnel Company the case of Symmes vs. the Union Trust Company of New York. Every point was decided in favor of the tunnel company and every act of Adolph Sutor was upheld by the Court. Judge Hawley said: "There was no fraud, and the board of trustees advised at all times, and Sutor's fee of \$100,000 was not exorbitant, as talents of a superior order were required. All the stockholders of the company had been fully notified of every step of Sutor and they could have protected their shares had they so desired." The decision involved the review of 5000 pages of testimony, 800 pages of briefs and 200 pages of pleadings. The Judge reviewed all the evidence and quoted numerous authorities on every point. He commenced his reading in this case last July. The delivery of the opinion occupied three and one-half hours.

Assessment Work Suspension Again.

It might have been expected that the suspension of assessment work on unpatented mineral claims by Congress for 1893 would lead to agitation for a similar dispensation during the present year. Petitions asking for the re-enactment of last year's law are now being circulated in Idaho, and are being numerous signed and forwarded to Congress. It is argued that if conditions rendered the suspension justifiable in 1893, exactly the same reasons ought to prevail in 1894. The silver mining industry is in a condition even more deplorable than a year ago, and mineral land claimants are more than ever unable to carry out the requirements of law.

There will probably be no very serious objection to granting the petition of the miners. It therefore seems altogether probable that Congress will take a generous view of the situation and re-enact the law. Indeed, it is not at all unlikely that the whole matter of assessment work on unpatented claims may be opened up and a serious effort made to abolish the requirement altogether. It is a fact well known that the law is more honored in its breach than in its observance, and that, in a great many instances, it wholly fails to carry out the purposes for which it was enacted, viz.: the enforced development of mining properties and the prevention of consolidation in the hands of one person the possession of many idle claims. It has, indeed, proved a factor in accomplishing the latter design, to a greater or less extent, but it is the pretty general conviction of mining men that some other statute might be more effective and satisfactory both to the government and to the miner who is not a speculator. It is believed by many that the mining laws of Mexico, requiring an annual rental, are an improvement over those of the United States. The rental could be small—say \$25 or \$50—and the proceeds in each district comprise a fund which might be used for the benefit of the district.

There are other considerations affecting the title to unpatented claims which are a powerful argument for improvement of the present law; but they do not need to be discussed here. It is sufficient to repeat that there should be some more definite method of requiring an annual expenditure on mining claims, or an equivalent thereof. Under present conditions there is no adequate method of verifying the simple assertion or affidavit of a claimant who says he has performed assessment work of the value of \$100; and, likewise, it is difficult and generally impossible to bring forward proof to dispute his claim.

If Congress does pass the relief measure for 1894, it is to be hoped that its intentions may soon be indicated. Last year, when the act was passed, very many claimants in California and other States and Territories had already complied with the law, and so the suspension was of no benefit to them. To be sure, they did not begrudge the relief afforded to those who needed and secured it, but it is not unreasonable to ask that action be taken early enough to make the law, if it passes, general in its operation, and to allow them to take advantage of its provisions if they desire. The matter should not be left in doubt.

The Anti-Debris Agitators Again.

Several events of interest to hydraulic miners have occurred during the past ten days. The Anti-Debris Association, resenting recent statements that appropriations from the several river counties for its maintenance are now given with reluctance, attempts to bolster up a staggering cause by securing passage by the Sacramento grand jury of a resolution declaring its undiminished confidence in the Anti-Debris Association and its work. The anti-debris people complain that their spies will have more than they can do with the coming of spring; and they declare that at least two mines are operating illegally. The only real sign given by the Association of a genuine intention to carry out the purpose for which it was organized and is maintained at public expense is in the shape of instructions to Attorney Devlin to take the necessary steps to prevent illegal mining. So far as it acts within the law, this step of the association, if carried out, will be supported by miners generally. The State Miners' Association has honestly attempted to discourage and suppress unlawful mining; and its attitude now is precisely what it has been. That is, it will not countenance infraction of the law. A way has been opened up by statute for the resumption of hydraulic mining, and it is the desire and purpose of miners generally that every effort be made to comply with the law and start the mines under its provisions. The miners have been disposed to give the Caminetti Act a fair chance; some of the anti-debris people are not. There is the difference.

One of the other entertaining features of recent occurrences is the attack of the Marysville Democrat, a hide-bound anti-debris organ, upon the river improvement

delegation recently sent to Washington, and incidentally a declaration of its confidence in the practicability and value of restraining dams. The Democrat is anxious for the construction of the proposed dam at Deguerre point, because "it is a necessary starting point of an engineering system for improving these rivers" (Sacramento, Yuba and Feather). The Democrat objects to Mr. Ohleyer particularly, because he is opposed to dams on general principles, and is particularly not in favor of a restraining wall at Deguerre point. The paper says further:

"But we are aware that there are a few men who place their own judgment against that of the Government engineers, men who consider themselves competent to dictate to those who are authorized by the votes of the people and by law to act in such cases. Such men are obstructionists, who chain the wheel of progress, and should be relegated to the rear and placed on the retired list."

These things may be taken as substantial proof of the declaration, several times made in these columns, that the old valley prejudice is greatly weakened and even dying out. The real sentiment of the valley—real, because intelligent—is that restraining dams fully protect their interests. It is well known by all residents of the Sacramento valley that the California Debris Commission is an impartial body whose duty and purpose are to protect the farmer. The Commission has said full security is afforded by restraining dams properly constructed. The declaration of the Commission deserves absolute credit. Only the professional agitators pretend to be alarmed for the safety of the residents of the valley. They have been waving the bloody shirt of warfare on the miner for so many years that it is impossible for them to break up the habit. Their next move, perhaps, will be to ask the State for pensions because of their long, arduous and heroic efforts in behalf of the "cause," and their invincible ignorance of the palpable fact that the war is over.

As an illustration of the popular method of expression by the chronic opponents of hydraulic mining in any guise, the following from the Sutter Independent may be given:

"Just kill off the [Anti-Debris] Association, retire the watchman and say let the Caminetti law take its course, and soon clandestine hydranlicking will be going on all over the watershed of the Yuba and Feather where it can be prosecuted."

In other words, the Independent means to say that the Caminetti Act is totally inefficient, and that the true policy of the farmers is to place their welfare, their safety and their prosperity in the hands of a self-constituted organization which is superior to the law and is better able to kill off the miner and exalt the farmer than the Debris Commission, the law or the courts. The Caminetti Act undoubtedly might be improved, and, we think, will be. We have no expectation that the policy of the law will be changed in the near future, and we think that the conditions under which hydraulic mining may be carried on are definitely fixed, and are likely to remain the same for many years to come. But there are several features which need correction. They will doubtless receive the early attention of Congress. It is not to be doubted that the Caminetti Act is backed by public sentiment, and for that reason, if for no other, we think the true attitude of the Anti-Debris Association is to give the Debris Commission its support, endeavor to secure enforcement of the law, and determine fully whether or not all interests are conserved by its operation. If they are not, the repeal of the law, or an adverse decision by the courts, will be certain to follow. If they are, a happy and satisfactory solution to the whole problem will have been found.

The Debris Commission, through Colonel Mendell, its president, suggests that Section 12 of the Caminetti Act be changed. At present, one clause reads:

"Pending publication thereof said Commission, or a committee thereof, shall examine the mine or premises described in such petition."

The Commission suggests the following:

"Pending publication thereof, or as soon thereafter as practicable, the mine and premises described in the petition shall be examined by one or more members of the Commission or by an engineer acting under its orders."

The proposed change is self-explanatory.

Foundry Notes.

THE Perkins Pump and Engine Company has been incorporated. Capital stock, \$50,000, half of which has been subscribed.

THE Keystone Boiler Works is constructing a boiler for the whaler, Wm. Baylies. The Baylies is being converted from a bark to a steamer. The total number of steam whalers leaving this port is now thirty-two.

REPRESENTATIVE HILBORN has introduced a bill in Congress making an appropriation of \$100,000,000 to provide for the erection and equipment of a gun factory at Benicia, Cal., for finishing and assembling ordnance for the army and navy. The bill provides also that this gun factory shall be erected upon the United States Reservation at Benicia, Cal., under the joint direction and supervision of the Secretary of War and Secretary of the Navy, and upon its establishment shall be placed under the joint and equal control of the Bureau of Ordnance of the Navy and Ordnance Department of the Army.

California Mines at the Midwinter Fair.*

California makes the most varied and complete display of its vast mineral resources at the Midwinter Exposition ever before attempted to be collected. The central ideas of its projectors were massiveness, richness, attractiveness and completeness; and in each of these particulars most satisfactory success has been achieved. It is, in the first place, the largest California exhibit ever made; in the second, it comprises the most valuable specimens; third, the arrangement is most tasteful and artistic and the specimens and various other features have been selected with great good judgment; fourth, the several branches of the mineral industry are adequately represented. Besides the mineral exhibit proper, there are shown in the vicinity different mechanical and chemical appliances for reducing ore, from a complete cyanide outfit to a five-stamp mill; from a primitive pan and long tom to the modern hydraulic giant. The exhibit, as a whole, possesses the rare merit of being interesting to strangers who know nothing of mining, and who by this means have been made to understand its processes and perhaps to retain a permanent interest in the industry.

The location of the exhibit is in the Mechanic Arts building, where it occupies about 10,000 square feet of ground space. It is not too much to say that it is the most conspicuous display on the floor. Visitors are numerous, and their expressions are uniformly complimentary. It is the design in this issue to mention the displays of El Dorado and Tuolumne counties, which are now complete.

El Dorado County.—The display is just to the left of the aisle leading from the main entrance of the building to the grand court, and it occupies about 600 square feet. The most conspicuous feature of the exhibit is a fine model, heroic size, of the celebrated J. Marion Wells bronze statue of Marshall, discoverer of California gold, erected at Coloma, El Dorado county. Its place is in the center, the base being covered with a great variety of ore and other mineral specimens. Entrance is effected through a slate arch 14 feet in height, from the Chile Bar quarry, 2½ miles north of Placerville. Specimens of slate from the quarries of the San Francisco Slate Company and of Jacob Stahl are also shown. Good specimens of white and mottled marble, from undeveloped deposits, are shown. A specimen of Indian Diggings marble is particularly clear and white, and is said to be equal to the best Inyo county marble. A fine block of sandstone from Pleasant Valley occupies a prominent place. A singular feature is the clear marking of the strata, which are distinctly black, red and white. The sandstone is said to be durable and able to resist the action of heat. A block of lava from Diamond Springs shows out in relief the name of "F. L. Lepetit, 1857." It is very well preserved, and amply proves that the lava is useful for building purposes. Soapstone for fireplace and similar uses is also shown. It is from Darlington's quarry, Placerville. Unslacked lime, in a hermetically sealed jar, is exhibited by the H. T. Holmes Company. Specimens of chrome ore, which are found in several places throughout the county, are displayed, and copper from near Fairplay and Coloma. In the latter the virgin metal is very clearly visible. A case of crystals from Messrs. Swanborough and Blackstone, White Rock, attracts a deal of attention.

The usual specimens of ore from the various mines of the county appear in large number. One from the Oro Fino mine weighs 4000 pounds, and several specimens from the Idlewild range from 1600 to 2000 pounds. There is a very large number of quartz specimens in a case (from the Idlewild) the values of part of which, determined by assay, are as follows: \$850, \$111, \$73, \$45, \$42, \$56, \$66, \$32, \$94, \$318, \$34.50, \$23, down to 50 cents. The \$850 specimen weighs 15 pounds.

El Dorado being the scene of the original discovery of gold, it might fairly be expected that many interesting relics would be shown; nor is anticipation disappointed. Among other things are the first mortar and pestle brought to the State for the purpose of crushing quartz; saw used at Sutter's mill; candlestick, knife, tape line, hammer, gun and walking cane belonging to Marshall, and a square iron shoe to which is attached the following description:

This is a shoe from the first 10-stamp wooden steam quartz mill ever built on the Pacific coast. It was shipped from Nashville, Tenn., via Cape Horn, and erected by A. L. Ohlton and others on the Concomnes river, in the town of Nashville, El Dorado Co., Cal., on the old California Consolidated, or Nashville, mine, in the years '50 and '51. Attached to the cabinet of J. O. Head, Nashville, Cal.

The exhibit is in charge of George Hofmeister, Placerville, who is courteous to visitors and takes pains to make them understand the many merits of the exhibit.

A summary of El Dorado's exhibit is as follows:

Roscolite sulphurets and gold-bearing roscolites from the

Grube mine; gold-bearing quartz from the Gopper mine, Kelsey; gold-bearing quartz from Coloma; gold-bearing quartz from Georgia slide; gold-bearing quartz from the Pacific mine, Placerville; also from the St. Lawrence, Kelsey; also from the Banner mine, Kelsey; specimen pin worn by Marshall, discoverer of gold; bottle of gold from Sutter's millsite; specimens from the Cedarberg mine, Greenwood; also from the Logtown, El Dorado; also from the Irish Creek mine at Kelsey, the Mount Pleasant mine at Grizzly, and the Middle Fork mine at Spanish Dry Diggings; asbestos from Garden valley, ocher from Garden valley, marble from Indian Diggings, copper ore from the Mount Queen mine; crystals; magnesia and cinnabar from Greenwood; pebbles from Dutch creek; sulphurets from Slate creek and Irish creek, isinglass from Pilot Hill, chrome from Coloma, nickel ore from Burner Hill; specimens of quartz, gold, silver and sulphurets from the Adam's Gulch, Montezuma, Church-Union, Nashville, Gabriel, Stony Point, Inez, Wilson, Pacific, Harmon, Volcanoville, Kelly, Hog's Diggings, Bonider, Crystal, Darling, Stillwagon, Black Rock, Big Sandy, Vandergrift, Potts & Murdock, Breathe Brothers, Idlewild and Snow Brothers mines; specimens of black silicate, crystallized quartz, marble, agate, lime, pumice and a large number of relics and curios from the famous Sutter mill at Coloma; Indian relics, curios, utensils, beads, baskets and the like; a 6000-pound pile of Oro Fino rock.

Tuolumne County.—The main purpose of the collectors of this very attractive exhibit appears to have been to show at once the variety of Tuolumne's minerals and the rarity and beauty of their specimens. The location is on the north side of the north aisle, where the display occupies about 500 feet of space. It is not too much to say that the exhibit as a whole is in quality the inferior of none, and it has many admirers who say it is the most choice, unique and tasteful in the whole collection. In general, its features consist of a magnificent collection of specimens; ore from the various mines; photographic views of the different localities and mines of the county; and other mineral and wood products.

Entrance to the exhibit is through a triple arch of eugar pine, beneath which, on a marble slab, rest several big chunks of quartz from the famous Rawhide mine, the assay value of which is \$26,000 per ton. The total weight of these specimens is 1600 pounds, from which their probable value may be determined. The quartz is the well-known mariposite, and is from a 15-foot vein between a banging wall of slate and a footwall of serpentine and diabase. It may be said in passing that the Rawhide is one of the famous abandoned mines of California, which was idle for about 26 years. Stamped in its new mill have been dropping now for a year or more. The great value of the mine is absolutely known. Its owners are A. J. Nevills and Meers, Ballard and Martin.

A leading feature of the exhibit is a pyramidal and octagonal cabinet, containing about 1000 specimens representing 400 mines. The cabinet is in the center, and it is about eight feet high. It is made of 261 pieces of wood, containing 38 varieties, including poplar, laurel, sequoia, maple, redwood, manzanita, etc., all from Tuolumne county. It is the handiwork of Joseph Oneto, employed at the Sonora mill of S. S. Bradford. Its arrangement is such as to show to fine advantage the many gold specimens it contains. These were collected from a great number of owners for the special purpose of this display. They comprise nuggets, leaf gold, drift gold, cement gold, gold in tellurium, crystallized gold and very many others. One piece of quartz gold, from the Garrett mine, weighs \$768. From the North Star mine another is worth \$154. On one shelf are 261 pieces belonging to Mrs. Judge Preston of Jamestown. One specimen shows leaf gold in crystal, very clear and very beautiful. There are 38 pieces of crystallized leaf gold belonging to Thomas Reed of Graveland. From the Page mine at Bald mountain is an exceedingly rare specimen of cube gold in tellurium. A splendid crystal, about two inches in circumference, shows clearly inside leaf gold.

Among other things are several quartz specimens from the celebrated pocket mine of Tuolumne. Mr. J. H. Neale, who is in charge of the exhibit, tells of one instance where, from a pocket in the Bonanza mine, Sonora, 968 pounds of gold were pounded out in a hand mortar. The detritus was later milled; the total net return from this pocket being over 1000 pounds of gold.

On a shelf in the rear of the exhibit are displayed ore specimens from 400 mines. They comprise every variety of quartz. One specimen of hematite weighs 170 pounds and is valued at \$352. Above this collection are affixed 125 fine photographic views.

The exhibit is in charge of Mr. J. H. Neale, Midwinter Fair Commissioner from Tuolumne. Mr. Neale is assiduous in his attention to visitors. He was chiefly instrumental in collecting the exhibit, which, by the way, involved no small labor, and he knows thoroughly the history, character and value of all the many things shown. He is evidently the right man in the right place.

A brief summary of Tuolumne's exhibit is as follows:

Leaf gold, foliated gold, crystallized gold, placer gold, gold gravel, nuggets and river gold, worth in all between \$7000 and \$10,000, and from some of the four hundred and odd mines of the county; gold quartz from the following mines: Alameda, Arbona, App, Ajax, Antelope, Alta, Buzzard's Roost, Belcher, Basin, Buena Vista, Belle View, Badger, Black Oak, Crystal-line, Criss Cross, Carlotta, Carmelita, Confidence, Comstock, Crown Point, Duffield, Dutch, Consolidated Eureka, Golden Gate (sulphurets only), Gerryman, Homestead, Hibben,

Hunter, Isabella-Gem Consolidated, Joe Hooker, Kanaka, Knox & Boyle, Keltz-Kelvin, Laura & North Star, Louisiana, Little Wonder, Laborator, Live Oak, Lamphore, Mohawk, Mary, Monte Cristo, Monitor, Mina Verda, Mooney, Mullins, Never Sweat, New Era, Noonday, New Albany, Parole, Prudhomme, Palo Alto, Platt & Gibson, Porto Fino, Raglio, Red Jacket, Rawhide, Saulsbury, Seminole, Sweeney, Senorita, Spring Gulch, Santa Maria, Silver Queen, Sonora Extension, San Giuseppe, Stent, Violet, Two Brothers, Worcester, Wheel Perin, Trio, Webster, Carrie, Mary Ellen, Old Tuolumne, Marks & Darron, Gross, Gillis & Carrington, O. K., Lady Washington, Woodpecker, Somerset, Riverside, Draper, Nonpareil, Cosmopolite, Buchanan, Rappahannock, Bonita, Consuello, Shangkai, Mount Vernon, Sopbia, Simonitch, Sngarman, Golden Rule, Heslop, Eagle, Patterson, Starr King, Grizzly, Obapparat, Stanley, Our Flag, Bonanza. Other exhibits: Marble from Columbia, 12 varieties; gold-bearing gravel, 10 varieties; granite, chrome iron ore, manganese, irridium ore, platinum, hematite ore bearing gold; placer gravel and gold from the Stanislaus and Tuolumne rivers; photographic views of quartz mills, mines, tunnels and mining scenery in Tuolumne county; 125 pictures.

Slitkens.

The Morning Star Mining Company of Nevada county has declared its 38th dividend at the rate of \$4 per share.

GEORGE M. NORTON, a famous Colorado mine operator, is dead. He was once well known in California and Nevada.

The pay rolls of the Comstock mining and other companies for the month of February amounted to \$61,995.50, or \$3214.75 less than for the previous month.

A lot of mining property and some amalgam was sold by an Arizona Sheriff under two judgments aggregating \$425. At public auction the lot brought \$7.50.

While Leonard Redding was cleaning out an old drill hole in the Gold Hill mine, near Angels Camp, the dynamite exploded and blew off one of his hands.

REPORTS from Lettbridge, B. C., where the coal miners recently struck, say that there will be no trouble unless it is sought to put non-union men to work.

It is not at all unlikely that by fall 2000 to 3000 people will be living out on the desert in the vicinity of Goler, Kern county, provided water and gold both hold out.

RALPH NICHOLS, the successor of Colonel Thomas to the superintendency of the Sutro tunnel, has arrived on the Comstock and will assume the duties of his position at an early date.

THERE is in San Benito county a mine of good coal. The vein is six feet in width on the surface and increases with depth. It is said that the railroad company has made an offer for the mine.

The Consolidated California and Virginia Mining Company has levied an assessment of 50 cents per share, aggregating \$103,000 and delinquent April 10th. The last previous assessment was levied on December 13, 1892, and was of an equal amount.

SEVERAL gold, silver, copper and iron mines near Bozeman, Mont., have been purchased by George W. Ballou, who represents a syndicate of New York capitalists. The price paid was \$1,000,000. The mines will be extensively developed and large concentrating works erected.

THE Chairman group of mines, consisting of the Southern Cross, Obainman, Obainman Gore, Turkey and "V," have been bonded to W. B. Graham for \$350,000, says the White Pine News. The chances are that a sale will be the outcome of the negotiations now in progress.

THE Pomona Mill and Mining Company has been incorporated. Principal place of business, Pomona. Capital stock, \$2,000,000, with E. B. Smith, W. D. Smith, E. Henderson, P. J. Tarr and V. E. White of Pomona, M. Maxson of El Monte and E. E. Powers of Los Angeles as directors.

DURING a blinding snowstorm, John Cameron of Tuscarora fell into a shaft some 25 feet deep, and was rendered unconscious. When he recovered his senses, realizing that no one could hear his cries for help, he used his pocket-knife to cut steps in the almost perpendicular sides and reached the surface unaided.

THE Reno Reduction Works have been leased by Russell, Bradley, Foley & Co. for six months, with the privilege of naming them for a year. It is said to be the intention of the lessees to work 5000 or 6000 tons of the English mill tailings at the works. R. D. Clark, who is one of the lessees, will have charge of the works.

THE finding of a \$520 nugget by W. Elmore near Copley last week and the recent finding of \$105 at Quartz Hill by Thomas Harrison, calls to the mind of the Shasta Courier that on Spring creek some fifteen years ago Rocon and partners took out a solid gold nugget weighing \$1100 and smaller pieces and coarse gold to the total amount of \$3300.

THE executive committee of the Anti-Debris Association has elected the following officers: President, J. M. Morrison; secretary, Robert Cosner; manager, W. T. Phipps; attorney, Robt. T. Devlin. The following legislative committee was also elected: Hon. F. R. Day, Hon. George Ohlleyer, John C. White, Robert T. Devlin and W. T. Phipps.

THE directors of the Excelsior Water and Mining Company of Smartsville have elected the following officers for the ensuing year: President, W. G. Halstead; vice-president, Louis Conrath; secretary, Joseph Duffee; treasurer, W. G. Halstead; assistant treasurer, Louis Conrath; general superintendent, Louis Conrath; mining superintendent, J. N. Flint.

At the annual meeting of the Wyoming Consolidated Mining Company the following were elected as directors: J. H. Widder, J. H. Manor and E. H. Baxter of San Francisco, and B. F. Runnels, W. L. Wallace, W. J. Rogers and W. E. Parsons of Grass Valley. The board organized by electing B. F. Runnels, president; J. H. Manor, vice-president; W. E. Parsons, secretary.

THE directors' monthly report for December, 1893, of the Robinson Gold Mining Co. of Johannesburg, South Africa, shows that the mine turned out 8214 tons of quartz, which yielded 10,063 ounces and 8 dwts. of gold. The concentrates and tailings, worked by chlorination and cyanide process, increased this amount to 17,062 ounces and 12 dwts. This was the total output from their own ores. Besides this the company purchased large quantities of concentrates and worked them, and altogether they made a profit of £38,594, 10s., 11d.

*It was intended, in presenting this review, to write up first the exhibit as a whole before taking up the various counties. In one or two small particulars, however, it is not complete, and the appearance and character of the exhibit all together must be deferred.

The Law of Cross Lodes.

The California Supreme Court, sitting in bank, has just handed down its decision in the Grass Valley case of Wilhelm vs. Silvester, which for the first time in this State settled a long disputed point as to the right of locations of cross lodes. The case concerned the New Idea location near the Gold Hill mine on appeal from the Superior Court of Nevada county. It first came up before Department 2 of the Supreme Court, but was considered of such importance as to be laid over for a decision of the full bench. Before this full bench (or bank) it came up in Sacramento last November and has now been finally passed upon. Some of the State courts, notably Colorado, have held a different opinion, but, as stated, the matter has never before been passed upon in California. It is believed that the decision will have an important bearing on the Champion and Wyoming litigation now in the Circuit Court. Throughout the controversy A. Burrows represented Silvester, and Kitts and Bowman Wilhelm et al. The decision affirms Silvester's right to the ground and all veins within its limit, whatever their direction.

As reported in the Grass Valley *Tidings*, the contention in this case was one as to the proper construction of the mining laws of the United States. It is admitted that in 1879 the respondent only located the "New Idea Quartz Mine," the same being a parcel of land 1500 feet long by 600 feet wide, and that about one year after such location the plaintiff's, against the respondent's consent, attempted to locate a claim called South Scotia, which bisected the New Idea claim, taking in 600 square feet thereof.

At the time of said attempted location, the respondent's New Idea location remained a valid existing prior location, and the respondent has ever since its location complied with all the laws of the United States and local customs.

Plaintiffs claim that because they discovered a cross-ledge which penetrated the New Idea claim, that so much of the New Idea premises as was necessary to locate said cross-ledge became subject to location and that such cross-ledge thereupon became the property of the plaintiffs.

The defendant claims, under Section 2322, Revised Statutes of the United States, which gives him in terms: "The exclusive right of possession and enjoyment of all the surface included within the lines of his location and of all veins or lodes throughout their entire depth, the top or apex of which lies inside their surface lines."

The plaintiffs, Wilhelm et al., claim that Section 2322 has been modified by Sec. 2336 of the same Act, which says, "where two or more veins intersect or cross each other, priority of title shall govern and such prior location shall be entitled to all ore or mineral within the space of intersection for the purpose of convenient working of the mine; and where two or more veins unite, the oldest or prior location shall take the vein below the point of union, including all the space of intersection."

Silvester's attorney made the following points:

1. Section 2322, R. S. U. S., makes him the absolute owner of all the veins whose apex falls within the lines of his location. Section 2336 has no application to any location made under the Statutes of 1872, but applies only to the old style "ledge locations" made before 1872, and included no surface ground, but simply the lode itself. (*Eclipse vs. Spring*, 59 Cal., 304.)

2. There is not a single sentence in Sec. 2336 which confers any right to lode or ledge matter, on the junior locator of a mining claim, or recognizes a "location" on land not otherwise subject to location. The only right conferred on a subsequent locator is the "right of way." But there is no contest as to a right of way in this controversy.

To say that Sec. 2336 implies enough to repeal and abrogate the provisions of Sec. 2322 of the same act, relative to the "exclusive rights" of the first locator, is absurd and contrary to the rules of statutory construction. The statute protects the oldest locator of a ledge from any local rule that might deprive him of his vein below the point of union, but not confer any right on any other locator. Its object was to protect the senior locator as to the vein and a junior locator as to right of way, and it cannot be construed to intend anything else, so as to abrogate other express provisions of the same act.

In his opinion Sec. 2336 was never intended to modify Sec. 2322, but was meant to supplement Sec. 2320, where it fits in without any such torture, straining or inconsistency as must be adopted in attempting to apply it to Sec. 2322.

The act of 1872 applies to three classes of mining claims: (1) Those already in existence and known as "ledge locations," as regulated by Sec. 2320 (and also by Sec. 2336); (2) locations to be made under the said act of 1872 described especially in Sec. 2322; and (3) placer claims, described in Sec. 2329.

His theory of the application of Sec. 2336 was that it applies solely to the numerous ledge locations, which existed when the law passed, and that the attempted location

of South Scotia, by intruding on the side lines of the New Idea, was invalid so far as it included a portion of the New Idea, because not made on the public domain and also because it constitutes a trespass by virtue of which no right whatever could be initiated, and the provision of Sec. 2322 as to the exclusive right of the locator to the possession and enjoyment of all veins whose apexes are found to be within his surface lines admits of no exception whatever.

With this position the Supreme Court now concurs and affirms the judgment of the court below.—*Tidings*.

Ore Shipments from Shasta.

TO THE EDITOR:—I notice by the PRESS and by receiving new ore rates from the railroad company that freight on ore has been lowered. The conditions to be complied with are the principal objections to this reduction. The lowest rate given—that on \$50 ore—will not be used from this part of the State. It does not pay to send ore of less than \$50 value to smelters. Rates for the other values in carloads are much below the old rates. But from \$100 up, when the per cent according to weight and the per cent according to value is added there is little difference from former rates. This ore tariff says, in the absence of positive information as to the value of ore, the agent will bill high enough to protect the company, the rates to be corrected when actual value is produced. This actual value is to be found by "special assay" if the railroad company wish. They must then sample the ore to get the average before assay can be made.

Is there a miner whose manhood is so dead that he would willingly stand by and see the employees of the Southern Pacific sample his ore? This is done under the thin guise of protectlog the company.

The value given in the shipping receipt protects the company in law, and there is nothing else. Freight must be paid in advance, and after they, as carriers, have delivered the ore at the smelter, they can have it sampled and assayed for their protection! This would only be equalled by the Southern Pacific employees seizing a passenger at his destination and plundering his pockets to see how much value he had about him and readjust the amount paid for passage according to the value found on his person! Ore tariff No. 1 means that the railroad company are to be partners of every miner who is shipping high-grade ore on the line of their road, and gives them part of the proceeds; and as they own every other section of mineral land, they can find out whose land the miner is on and force him to buy it.

The railroad company having possession of all the odd sections of mineral land is the greatest detriment we have to contend with in developing our mines in northern California. The attention of our Congressmen and Senators should be called to this, and a committee appointed to come here and see that it is not such land as they are entitled to by law. They are selling this land, rich in mineral, as agricultural; when it is nothing but a mass of upheaved rock, the purchaser buying for the mineral only. A committee was appointed by Congress to go to Montana and Idaho to set aside mineral lands held by the railroad companies. Why not have one come to California?

Shasta, March 5, 1894.

JOSEPH E. BELL.

Carson River Dredge Plant.

For the information of inquirers as to the process whereby the Carson River Dredge Company expects to recover a portion of the wealth buried in the bed of that stream, representing the percentage of amalgam and quicksilver lost in milling Comstock ore, the *Enterprise* publishes the following description of the company's plant:

The steam dredge is operated on a flat-bottom boat or scow with a double deck, the lower deck or hold containing the machinery. This boat is about 80 feet in length. The dredge has a lifting capacity of several hundred tons in 24 hours. Another boat of still greater length is equipped with a double line of flumes or sluices. When the material is raised from the river bed it is discharged in the flume and is washed on the same principle as in placer mining. When it leaves the flume it flows over a line of Woodbury concentrators. Tests of these concentrators show that the sulphurets are concentrated to a high percentage above the value of the material in bulk.

The tests so far were made with two concentrators, and demonstrated that with a sufficient number of them, to handle the material as rapidly as it is raised by the dredge, a net profit of from \$1000 to \$1500 per day can be realized from the sulphurets after they have been run through the amalgamating pans. Next spring the company will have all the concentrators in position required to handle the material with the dredge operating to its full capacity. The entire cost of the present plant has been contributed by the shareholders in the Dredge Company, the stock of which is unassessable. They have been experimenting during the

past six years on the best method of recovering at least a part of the vast wealth from the river bed, and the officers are now satisfied that they have solved the problem.

For a Mines and Mining Department.

TO THE EDITOR:—In your issue of March 3rd you say, editorially, that State Mineralogist Crawford has informed the Associated Charities of San Francisco, in answer to their inquiries, that he is unable to give them any information about placers in this State which could be worked by the unemployed. This statement illustrates the need of a thorough and systematic digest and comprehensive bureau of authoritative information in regard to this great and distinctive department of the Nation's economy, and justifies, in a striking way, the action of the Trans-Mississippi Congress, while in your city recently, in passing a resolution recommending that the United States should enact a law creating a Department of Mines and Mining, similar to that of Agriculture.

Were there such a department in our National Government, the mining lands could be so tabulated that the appropriated, the unappropriated, and the abandoned mines would be known and easily designated. Then, in the event of hard times, such as we are now having, the unemployed citizen, with little assistance, could be got upon them and be enabled to make a fair competency, if not a fortune, for himself.

The Government of Australia, by reason of its having a Mining Department, has, during the last year, given work to several thousands of the unemployed in her mines, and the plan has worked admirably, as well as beneficially.

The county of Siskiyou, which is nearly as large as the entire State of Massachusetts, has many thousands of acres of unappropriated mineral lands, and many abandoned mines, which could be made to yield a livelihood to the unemployed citizens of the United States, were there only some National bureau to properly formulate rules for their guidance.

In common with many of your readers among the miners, I hope that you will agitate the question for the formation of a National Department of Mines and Mining.

ANDREW G. MYERS.

Fort Jones, Cal., March 5, 1894.

Great Mines of California.

Conclusion of Melville Attwood's paper on "Metalliferous Deposits," read before the Academy of Sciences March 5, 1894.

The gold mining business in California has seldom looked brighter than at the present time. Old abandoned mines are now being opened out and worked with success; water, improved methods of extracting and milling the rocks, cheap labor and reduced cost of supplies enabling the miner to work rock to a profit for what it cost him to mill it in the early days.

I feel confident that if the same amount of capital now being spent in the African gold mines were judiciously invested in our California gold mines, the results would be so satisfactory as to again attract miners from all parts of the world. One instance of the results of judicious investment of capital in California was the Eureka mine. The enterprising Jules Fricot purchased it, and in 1864 sunk a perpendicular shaft to the depth of upward of 100 feet, which intersected the pay shoot at that depth. He then built a quartz-mill and erected hoisting and pumping machinery. He afterward disposed of part of the property to a San Francisco company, who took out \$5,700,000 from the claim, a large proportion of which was paid in dividends. The Idaho and Maryland claims are a continuation of the Eureka pay shoot, and in the same fissure. The Coleman Bros., to whom Grass Valley is so greatly indebted, first bought the abandoned North Star mine, made a success of it, and then sold it for a large sum of money. They then commenced work on the Idaho, which, by good management, has proved so far to be the richest mine in California, yielding in the neighborhood of \$12,000,000, and it is said, nearly one-half of that has been paid in dividends. No mining capitalist on this coast has developed richer gold mines than Alvinza Hayward Esq., and his operations have not been confined to a few localities. With good judgment and practical knowledge he has opened out old abandoned mines, and, with the aid of improved machinery, made them good paying concerns. For instance, the Utica mine, the output of which for a considerable time has been greater than the richest of the African gold mines.

By the action of the directors at Sacramento, Denver Waggoner has been appointed to succeed Stephen B. Fowler as superintendent of the Granite Hill mine, Nevada county. Within a few weeks work will be resumed.

CONTRARY to the expectations of many, the Bland seigniorage bill has passed the House. It appears to have an even chance of passing the Senate.

The Gold Mines of Plumas.

J. A. Edman in *Plumas National-Bulletin*.

Foremost among the resources of Plumas county stand its mines of gold, silver, copper and iron, of which the gold mines alone have as yet received any extended development, considering the extent of the county. Occupying an area of 2600 square miles, or more than the whole of the State of Delaware, and with a population of less than 5000, it could not be expected that even the ubiquitous prospector had explored all of its rugged and remote fastnesses. As a consequence the principal mines are found near the highways traversing the county.

The main gold-bearing belt of California, which in the middle counties is comparatively narrow, and in Amador and Nevada counties seldom exceeds 30 miles in width, gradually widens in following the trend of the Sierra Nevada northwesterly, and in Yuba county attains a breadth of about 42 miles. Expanding still farther, we find it in the region opposite Oroville covering an area over 70 miles wide, measured on a line running northeast from Oroville and through Butte and Plumas counties. Gradually curving westward it maintains and even exceeds this

where the Sierra Nevada may be traced as one continuous chain, with the affluents of the Sacramento and San Joaquin rivers coursing down its western slope, and generally at right angles with the trend of the mountain chain, a break in the system occurs in Sierra county, and within Plumas appear two well-defined ranges, of which the western presents two separate axes of uplift, marked by peaks rising to 7000 feet altitude. The eastern range, forming the watershed between the Pacific and the Great Basin, is distinct and well defined from Summit peak northward, but before it approaches Lassen peak, merges into and intimately connects with the main mass of the Sierra.

The drainage system of Feather river and its tributaries which ramify through every part of the territory, presents peculiar features. The North Fork, rising well toward the summit of the eastern range, in the region of Mt. Lassen, pursues a general north and south course, cutting a deep gorge in the western range. The Middle Fork, rising in the elevated valleys between the two ranges, takes first a northwesterly course, then breaking through both divisions of the western range, eroding its bed over 3000 feet deep, turns westward, then southerly, and unites with the North

of Nevada and El Dorado counties, that the mines of the western division produce most of the free-milling quartz, as well as ores associated with iron pyrites alone, while the veins of the eastern division furnish some refractory ores, associated with copper, galena, zinc-blende and arsenical pyrite. The eastern range of the Sierra is here eminently the copper-bearing region, and, at its junction with the main range, as at Genesee valley and Lights canyon, free-milling gold ores are found side by side with large and important copper lodes, as well as, but rarely, with silver-bearing veins.[†]

The more important ore deposits of Plumas county may, for purposes of description, be placed in the following ten groups, each group chiefly determined by distinctive rock formations and to less extent by topography:

- | | |
|-------------------------|---------------------|
| 1. Granite Basin group. | 6. Genesee group. |
| 2. Spanish peak " | 7. Lights canyon " |
| 3. Diadem " | 8. Plumas-Eureka " |
| 4. Black Hawk " | 9. Pilot peak " |
| 5. Indian valley " | 10. Feather river " |

[†] The systematic geology of the Sierra Nevada, both outside of and within Plumas county, has been scientifically investigated by Prof. James E. Mills of Quincy, but only a small part of his deductions



THE SAN JOAQUIN COUNTY BUILDING AT THE MIDWINTER FAIR.

width, till in the vicinity of Big Meadows the volcanic formations centering at Lassen's peak encroach upon and cover its northern portion, while the main gold-bearing belt continues into Shasta and Trinity counties.

Situated entirely within the high Sierra and generally above an altitude of 3500 feet, the western border of Plumas attains an elevation of nearly 4000 feet, except in the gorges of the North Fork and Middle Fork of Feather river, where erosion has cut its bed to less than 2000 feet above sea level. Its northern and eastern border from Mt. Harkness (altitude 8875 feet) to Summit peak (8302 feet) in the south, follows the crest of the easterly range of the Sierra Nevada, the watershed between the Pacific and the Great Interior Basin, and with an average altitude exceeding 6000 feet, except where cut by the natural gateway to California at Beckworth's Pass, at 5220 feet elevation.

With the exception of about 360 square miles of northern Plumas, covered by the geologically recent volcanic deposits radiating from Mount Lassen, and the elevated basin of Sierra valley in the south occupying nearly 200 square miles, the whole of Plumas county presents several systems of metalliferous veins and lodes, as well as an infinite variety of recent and ancient gravel deposits, which attain their greatest extent and importance within the southern and western sections of the county.

As far as they are intimately connected with the origin and distribution of its ore deposits, the topography and stratigraphy of this mining region may here be briefly reviewed.* Unlike the counties to the south of Plumas,

Fork in the foothills of Butte county.

The magnificent water power that these streams furnish and the facilities for thorough drainage in mining operations which the deep canyons afford, have been as yet but slightly appreciated and still less utilized for economic purposes.

The largest portion of the eastern range of the Sierra belongs, in climate, in natural history, and in geological features, to the Great Basin. Its lithology has been but little studied, and its mineral resources scarcely at all developed. Where it merges into the western range, its stratigraphy has been well investigated by J. S. Diller of the U. S. Geological Survey, and its ore deposits have there been fairly well developed in the gold and copper mines near Genesee valley.

But it is within the western range that the gold-bearing rocks attain their greatest development in Plumas county, and within this area, comprising fully 1800 square miles, not a township is to be found, where exploration has failed to show valuable lode or gravel deposits. In viewing the rock formations, a distinction may be made between the eastern and western divisions of the west range, as, while both contain crystalline, archaic and metamorphic rocks, the eastern division, in which Eureka peak, Argentine rock and Mt. Hough mark the summit of elevation, presents a great variety of volcanic and trap rocks, such as tufas, basalts, trachytes and porphyries; while the western division, having as its monuments of uplift Pilot peak, Claremont and Spanish peak, is chiefly represented by granites, syenites and metamorphic slates. In relation to character of ore deposits, a generalization may be admissible, conforming to the evidence of the gold-bearing lodes

has been published, mainly in the bulletins of the Geological Society of America.

San Joaquin County at the Fair.

The county buildings comprise some of the most unique and attractive features of the Midwinter Fair outfit, and the county exhibits are the backbone of its industrial display so far as natural resources are concerned. Without these factors the Midwinter Fair would fall far short of its present standing as an exponent of California progress and achievement. Due credit should therefore be given to county enterprise and to the individual efforts which made the aggregate possible.

We give on this page a view of one of the most notable of the county structures, that of San Joaquin county. San Joaquin has a good record for enterprise in industrial displays. Its Midwinter display is the greatest of all its achievements, and one which shows best its various means of wealth creating, for it bespeaks in its entirety the enterprise and generosity of the people, and in its materials displays the achievements of the manufacturing interests of a thriving city as well as the productions of rich fields, orchards and gardens. One can hardly contemplate the exhibitions made at the fair without feeling the conviction that some of our counties are fitted to rank as States or empires upon the basis of natural and developed wealth and successful industry.

The engraving shows so well the style of the San Joaquin building that little description is necessary. It is of commanding dimensions and fitting style. Its interior is excellently adapted for the purposes in view, and affords not only opportunity to display but opportunity to see and

*The general geography and topography of Plumas county has been ably determined and illustrated by the surveys and maps of A. W. Keddie, C. E.

to obtain both near and distant views, and to rest during contemplation. Its cupola also affords a good lookout over the fair site which is much enjoyed. The building was put through in an almost incredibly short time, and speaks well for the energy and sagacity of Mr. P. A. Buell of Stockton, to whom the management of the whole enterprise was entrusted.

The Water Supplies in the Arid Regions.

Part III.

By J. W. Powell, Director of the U. S. Geological Survey.

Sources of Water Supply, Continued.

[Major Powell uses a specially prepared map to show estimated runoffs from the different regions of the United States, and continues as follows:]

In the construction of the runoff map the laws heretofore explained have been used, and topographic features have received consideration. It will be seen that the runoff map does not wholly coincide with the rainfall map, from the fact that topographic features play a more important part in runoff. Altitude affects rainfall, and altitude and character of surface affect runoff; and as rainfall becomes less, runoff is affected by character of surface in a steadily increasing ratio.

Turning to the districts represented in the map, the following statements may be made: It has been seen that the practical duty of water is 24 inches. Now, where the runoff is from 5 to 10 inches, if all the runoff were caught and used in irrigation, nearly one-third of the land could be irrigated, but in that region the rainfall itself is usually sufficient for agriculture, and irrigation is only needed as supplementary to the rainfall.

Effect of Topography.—Where the runoff is from two to five inches the total is about one-seventh of the amount necessary for irrigation; that is, a catchment of seven acres, if all is utilized, will irrigate one acre. Where the runoff is from nothing to two inches some interesting conditions are found, which must be more fully explained. Here the topographic conditions are controlling, and very large districts exist where there is no runoff, and other districts where the runoff is very slight, it being found only in storm-water streams and very infrequent springs. We may divide this district where the runoff is from nothing to two inches into three portions, which appear to be nearly equal. As determined by topographic conditions and diminished rainfall, one-third will have no runoff, another third will have a runoff of one inch, and the remaining third a runoff of two inches. If all this water could be caught and used upon the land in irrigation, then on the land where there is no runoff there would be no irrigation; on the second portion, where the runoff is one inch, one acre in twenty-four could be irrigated; on the third portion, where the runoff is two inches, one acre in twelve could be irrigated.

Absolute Catch and Possible Catch.—So far we have considered the problem only on the supposition that all of the water can be caught, but this is not possible. The total runoff we will call the absolute catch, and we will now proceed to find the possible catch, the practical catch and the crude catch, as we have defined the absolute duty, the possible duty, the practical duty and the injurious duty of water.

The water which is used in irrigation must be caught. The season of irrigation is short as compared with the remainder of the year. All the water which is not used as it is caught must be stored in reservoirs; but from these reservoirs a part of the stored water will evaporate, the amount varying in different latitudes and altitudes from 50 to 100 inches annually. That is, if a reservoir has a surface of 10 acres, then 10 acres of water 50 to 100 inches in depth will be evaporated annually. It is not possible, therefore, to hold all the water stored; but if we suppose that the catch of the waters be perfect, which can be effected only at an enormous and impracticable expense, then the possible catch is that which is used immediately after being caught and that remaining in the reservoir after evaporation. This possible catch will be 30 per cent less than the absolute catch. Space does not here permit of a discussion of the facts which lead to this conclusion, and only the simple statement is made. The possible catch, then, is 70 per cent of the absolute catch.

The Practical Catch.—The possible catch is impracticable by reason of excessive cost; and we have a further reduction to make. Where the catch is concentrated by greater rainfall and most favorable conditions of topography, the practical catch is comparatively large; where the rainfall is less and the topographic features more unfavorable, the practical catch is very small. It will never pay to impound the storm waters of sand deserts; it will never pay to impound the storm waters of bad lands; it will never pay to impound the storm waters of land of volcanic scoria; and there are many other minor conditions of

storm-water catching which are inhibitory. Storm waters can rarely be caught at a practical expense where the rainfall is less than 12 or 15 inches. All such waters must therefore be neglected as not entering into the problem of the catch. But where there are mountain lands which condense an amount of water greater than the adjacent lowlands, and where at the same time the catchment surfaces are topographically advantageous, very large quantities of storm waters may be secured; but to a large extent they are added to perennial streams, and their catch, therefore, depends upon the control of perennial streams.

Limitations upon Cultivation.—There is still another important factor to examine in this connection. Rains fall in intermittent storms. Some showers are gentle and furnish small amounts of water; some great storms furnish large quantities of water. The maximum storms which cause destructive floods fall at intervals of years. Now it will never be practicable to catch all the water of maximum storms, because of the great expense of constructing the necessary works. On every stream where works are constructed for diverting the water, spill-ways are necessary to provide against the maximum storms. Practically, it will be found economic to waste all the water of storms which much exceed the mean, and these are the rains which serve greatly to increase the runoff.

We have, then, to deduct from the possible catch that portion of the storm-water streams which must be neglected and that portion of the great storm floods which will be spilled, which together amount to about 30 per cent. Thus the possible catch will be reduced to the practical catch. The reason for reaching this conclusion cannot be entered upon here for want of space. It is thus found that there are inexorable conditions which limit the amount of land which can be practically cultivated in the arid region. The practical catch and the practical duty of water set these limits.

How Mountains Effect Rainfall.—Before proceeding to apply these laws in estimating the amount of land which can be irrigated, another important fact with regard to the water supply should be pointed out. Mountains concentrate the rainfall. Thus, in the great system of the Park mountains of Colorado; in the Wasatch and Uinta mountains of Utah and Colorado; in the Black Hills and the geyser mountains of Wyoming, stretching up into Montana; and in the great mountain systems of Montana and Idaho, large areas of increased rainfall are found. Again, in central Washington, Oregon and eastern California, the Cascade mountains and Sierra Nevada furnish another example of increased rainfall. This gives to the arid lands of these States, where irrigation is necessary, large streams of water having their sources in the mountains where the rainfall is great and the runoff is also great. In the upper regions little or no irrigation is necessary, and only small areas can be cultivated because of the mountainous character of the country. These mountain-born waters, therefore, may be used upon the mesas, plains and valleys below. This gives to all of these districts a large source of water supply, which is often limited only by the distance to which it can be practically carried in canals. In making a general statement of the amount of land which can be irrigated in the United States, it is necessary to consider these facts also.

Amount of Land that Can Be Irrigated.—It is proposed now to consider those areas of country in the western half of the United States where the rainfall is 20 inches or less. There are large districts of country which can be profitably irrigated where the rainfall is more than 20 inches, but for present purposes these are neglected.

The total area where the mean annual rainfall does not exceed 20 inches is about 750,000,000 acres. The water to be used in irrigation in all of this country, with some slight exceptions hereafter to be noted, is the natural runoff from the same areas, to which must be added the amount of water caught in the mountain regions where the rainfall is more than 20 inches, but which runs down where it can be taken upon the lands having 20 inches of rainfall or less. When we compute the absolute runoff of all of this region, it is found that if it could be all caught and all distributed upon irrigable lands at the rate of 24 acre-inches to every acre of crop, the amount which could thus be irrigated would be about one-tenth of the whole, or 75,000,000 acres. But this supposes an absolute catch, which is impossible. Reduced to the possible catch (which is not practical) the amount is little over 52,000,000 acres. This reduced again to the practical catch gives a little over 36,500,000 acres. This, then, is the amount of land in the arid region where the rainfall is 20 inches or less which can, under practical conditions, be redeemed for agriculture by irrigation through the use of the natural runoff. But to redeem it, all the practical catch from the arid region and from the mountains which deliver their water into the arid region must be utilized.

In the above estimate only natural runoff has been con-

sidered. We must now turn attention to other sources of water to which reference has been made from time to time.

It will be seen that in making this estimate it is proposed to transform runoff water into flyoff water through the agency of growing crops and the evaporation consequent on the processes of irrigation. Now a portion of the natural flyoff can be caught before it is evaporated and can be used in irrigation.

Supplies by Pumping.—First. Some of the rainfall sinks away into the earth, where it in part runs off by spring, but in chief part by slow evaporation, coming to the surface by slow evaporation, coming to the surface by capillary attraction. This water which sinks into the soil can be utilized as an important supply, adding to the total only a small percentage, it is true, but when measured in acres the amount is worthy of consideration. Into the surface soils and rocks wells may be sunk and the water may be pumped upon the land for irrigation. The actual experience of mankind throughout the world exhibits the fact that millions of acres are thus cultivated. The tracts redeemed by single wells may be small, but such pump wells in the aggregate furnish considerable quantities of water, even in measures which irrigation requires, by acre-inches and acre-feet.

Artesian Waters.—Second. Waters which sink away underground are often carried to considerable depth, and may be returned to the surface by hydraulic pressure under proper geological conditions. These supplies are known as artesian waters. In the practical operations of irrigation throughout the world, it is found that artesian wells may be made to supply considerable quantities of water for irrigation. Single artesian wells furnish on the average much greater quantities than single pump wells; but artesian wells are successful only under greater intervals of areal space.

Floodplain Waters.—Third. Along the course of storm-water and perennial streams there is usually found a floodplain—a belt of country on either side of the stream which receives the overflow from the stream when great storms occur that swell it beyond the capacity of its banks. In such floodplains accumulations of sand and gravel are found irregularly distributed among soils and clays. These sand and gravel deposits become natural reservoirs for water, which comes down in part from the adjacent hills, but in larger part from the great floods. Now, these floodplain waters can be secured for irrigation, either by tapping them with canals that lead to lower ground, or by sinking wells and pumping out the water. In actual practice both the gravity method and the pump method are used, but in general the pump method is found more economical.

The irrigable area of the arid region can therefore be increased from these three sources, but the quantities cannot be exactly defined without most thorough geological research. Some districts will afford much, some little, by varying geological conditions, but actual experience proves that the amounts are considerable and worthy of notice in such an account of water supply as we are now giving. It seems probable from the general experience of other lands that three or three and a half million acres may be added to the total for the arid region by the use of pump waters, artesian waters and floodplain waters. This, then, will give to practical irrigation in the arid lands where 20 inches of rainfall or less is found, a total area of 40,000,000 acres.

Amount of Land Under Cultivation.—In no civilized land is all the land cultivated. Denmark has the greatest amount, where 75 per cent is under the plow. When these 40,000,000 acres are cultivated by methods of irrigation they will be found wonderfully productive, and their products will support a population as great as that found in the United States at the present time. It must be many decades before it is all redeemed. As from district to district farmers come nearer to the realization of the practical catch, more refined methods of catch will be adopted and the practical catch will be increased; but this will not result in increasing the acreage cultivated, for, at the same time, better methods of irrigation will be developed, from which a greater production will result and which will require a greater practical duty of water.

A word must be said about the character of this investigation and the degree of probability which inheres in its results.

In measuring rainfall and runoff, only averages can be given. A farmer sells a field of corn standing in the shock. In order that he may establish its value, he husks and measures a few shocks and derives therefrom an average which controls the quantity in the terms of the sale. The average thus obtained will never, except by accident, be exactly that of any one shock of corn, and yet an approximation to accuracy will be reached sufficient for practical purposes of trade. In like manner, the statements made in this paper are rarely, if ever, absolutely accurate for any one small district of country, and the quantities must al-

ways be taken as mean quantities, which only approximate accuracy.

Most of the lands now irrigated are watered by streams and irrigating works that do not require the most expensive plants; that is, the small streams are nearly all taken out upon the land, and a small stream irrigates a small area at a correspondingly small total cost. As irrigation is extended, larger and still larger plants are generally, though not always, necessary, and for this purpose aggregated capital is necessary. This capital will sometimes be secured by co-operation among the irrigators themselves, and sometimes capital will itself lead the way, for the purpose of increasing the value of lands and selling the same with water-rights to the farmers. Whatever method is pursued, aggregated capital must be employed. Therefore the farmer and the capitalist alike are interested in these results. Before money or labor is to be invested in irrigating works, it becomes necessary to consider the water supply. Is there land? is the first question raised; Is there water? is the next question; and, Can the water be carried to the land with reasonable economy? is the third. Many canals have been constructed without a proper consideration of these three questions, and already capital has been wasted, and we have now reached a time in arid America when these three primary questions relating to irrigation enterprises should be properly answered, before lands are bought and sold, homes established, labor organized and capital invested. Without these precautions bonds are worthless.

The Red Point Drift Gravel Mine.*

By C. F. Hoffmann, Mem. Tech. Soc'y.

In Three Parts.—Part I.

In starting the work of this mine the writer could find no published data upon which to base any estimates, and concluded to keep a full record during the progress of the work for future use.

The Red Point is a drift mine in one of the ancient lava-capped river channels of the Forest Hill Divide, Placer county, California, located at an elevation of 3875 feet above sea level, or 2000 feet above the North Fork of the American river. It belongs to the Golden River Mining Co. of Paris. The channel is known as a "blue channel," from the color of the gravel.

Discovery.—This channel was first discovered in the Mountain Gate mine, at Damascus, about a mile and a quarter distant from Red Point. The Mountain Gate was originally located on a channel of white quartz gravel known as the "white channel," which the owners followed in a southerly direction into the hill for a distance of 6500 feet, where they found it sharply cut off by a flow of lava or volcanic cement. The words "lava" and "volcanic cement" are used as commonly applied by gravel miners. The material in this section is composed of consolidated sediments from a volcanic mud flow, which have been variously described as tufts, tufas, breccias, conglomerates and cements. There is little or no evidence of a molten lava flow in this section except perhaps on the summit, where the lava is crystalline. The bedrock, with the volcanic cement resting upon it, pitched sharply to the south. After drifting to and fro along the contact, hoping to find the continuation of the white channel, the bedrock was followed down on its pitch, and the gold found to continue as far as the exploration extended. A drift was then run into the volcanic cement, and a winze sunk 90 feet down to bedrock, disclosing what is known as the blue channel. This channel was worked up and down stream for 1400 feet of its length, establishing its approximate course as southwesterly, or nearly at right angles to the white channel. It had not only cut away a large section of the older channel, but had worn down its bed to 90 feet greater depth. Soon after this the extension of the white channel was discovered on the opposite hillside, several miles to the south, where the Hidden Treasure mine was located. From this point of discovery it was followed up stream into the hill to the north for a distance of 10,000 feet. Here again it was cut off by the same lava flow covering the blue channel. It is this blue channel that the Red Point mine is located upon.

The Gold River Mining Co., having secured the ground to the northeast, had careful surveys made of the Mountain Gate mine and also of the rimrock (contact between the volcanic cement and bedrock) exposed on the surface for a distance of 8 or 9 miles to the northeast, along the Forest Hill Divide. These surveys, including levels, furnished an assurance of the confinement of the channel within the company's ground. There were no points of the rimrock low enough to permit of the escape of the channel; it was virtually hedged in. Upon the basis of these surveys a

point was located, and the Red Point tunnel started to tap the blue channel.

The data here presented concern this tunnel and the developments made through it. It was driven through slate bedrock in a southerly direction, the blue channel being tapped by means of an upraise 22 feet high, started at a point 1840 feet in the tunnel. The general features of the Forest Hill Divide are described in the State Mineralogist's report of 1890, and the map accompanying that report is partly based on the surveys made for the purpose just described.

Appended to this paper is a reduced copy of a portion of the above map, which will show the location of the Mountain Gate and Hidden Treasure developments in the white and blue channels, and the work of the Golden River Mining Co., from the Red Point tunnel.

The Tunnel.—The tunnel is 7x8 feet in the clear, has a grade of 3 inches in 100 feet, and when originally run had a double track for the first 100 feet, with a drain ditch in the center, and from that point on, a single track with the drain ditch on one side, and switches every 500 feet. The switches and double track have since been removed, as there was no further use for them.

The rails used are 16-pound steel rails, with a gauge of track of 20 inches. The air compressor is located 200 feet vertically above, and about 300 feet distant from the mouth of the tunnel, the air being conveyed through a 3-inch pipe which, in the tunnel, has valves and blowouts every 500 feet for the purpose of ventilation. There were no other pipes in the tunnel, except a 1-inch water pipe for drilling use (as at the time of running the tunnel).

After the location of the tunnel it was necessary to build a wagon road 6500 feet in length, leading from the summit to the compressor site, a difference in level of about 700 feet, also to bring water a distance of 2800 feet in a 2-inch pipe, to supply the works. The steepness of the canyon in which the tunnel is located made it necessary to do a great deal of grading, and to build crib work to make room for a framing yard, blacksmith's shop, etc., the cost of which is given further on, under the heading of "Yards, Dumps and Trails."

Work on the tunnel proper commenced on the second day of July, 1886, and 108 feet were run by hand with an average force of 6 men per day. The compressor was started on the fifth day of August, and on the 31st of January, 1887, the tunnel had reached a length of 1552 feet. The last 1444 feet were run with an average force of 20½ men per day. During the seven months the compressor was idle for 15½ days, on account of an accident to the air valves and the cracking of a casting, maklog li, therefore, only 6½ months work on the 1552 feet, or an average of 234.1 feet per month, including the hand work. The two largest runs made for two consecutive weeks were 71 feet for the week ending August 28th (six days work), and 84 feet for the week ending September 4th, or respectively 11.82 and 12 feet per day. The tunnel runs diagonally across the strike of the rock, which consists of strata of metamorphic slate, alternating with sheets of diabase, diorite and barren white quartz.

The regular force of men employed (when full) consisted of

15 miners working.....	8 hours per day.
2 engineers working.....	12 " " "
2 drivers working.....	12 " " "
2 blacksmiths working.....	10 " " "
1 timberman working.....	10 " " "

divided into three shifts and working two air drills on columns. The blacksmiths and timberman only worked in daytime, unless on account of hard rock, it was necessary for the blacksmiths to work extra time.

COST OF SURFACE IMPROVEMENTS, PLANT AND TUNNEL.

	Total Cost.
Road.—6,500 feet long; average grade 1 foot in 10 feet; commenced May 26, 1886; completed July 1, 1886. Average force of men per day, 9.2; cost including surveys and powder.....	\$ 963.00
Yards, Dump and Trail.—Commenced June 21, completed July 31st. Average force of men, 5.6; cost including crib work, timber and powder.....	508.05
Boarding house, office, blacksmith shop, stable, powder house, wood shed, framing sheds, snow sheds, etc....	2,310.10
Water Works.—Log Dam, 2-inch pipe, line 2,800 feet long to ditch and covered; commenced May 30th and completed July 30th. Average force of men per day, 2.74. Cost, including surveys, powder and pipe.....	604.94
Air Compressor.—Erection commenced July 1st; completed with pipe line to tunnel July 30th. Average force of men per day, 5. Cost of labor.....	970.00
One No. 44 Ingersoll straight-line compressor, 16 x 16 x 24; one 54" x 16' steel hoiler, complete; air tank, pump, three 3½-inch Eclipse drills and extras, freight and building 30 x 40 feet.....	7,819.86
Eight iron cars.....	1,200.00
Two tunnel horses, two team horses and huckboard.....	705.00
Total cost of plant.....	\$15,080.95

ACTUAL COST OF 1552 FEET OF TUNNEL, 7 X 8 FEET, UP TO FEBRUARY 1, 1887, EXCLUSIVE OF MANAGEMENT, INCLUDING 43 TIMBER SETS.

	Total Cost.	Cost per Running Foot.
Total labor (pay roll).....	\$11,418.47	\$ 7.56
Powder.—10,567 pounds Giauot No. 2, and 325 pounds No. 1, at 26½ c., 41½ c., 10 per cent off.....	2,641.64	1.70
Fuse.—39,650 feet at \$5.50 per M., and caps \$45.....	263.07	0.17
Wood.—402 cords at \$2.75 delivered.....	1,105.50	0.71
Charcoal.—1,604 bushels at 20c., delivered.....	320.80	0.21
Caolides.—1,760 pounds at 16½ c., delivered.....	290.40	0.19
Foot plank and ties.—7,355 feet of lumber at \$20 per M., delivered.....	147.10	0.09
Timbers.—43 sets at 6c. per running foot, delivered.....	46.76	0.03
Steel Rails.—16,640 pounds at \$50 per ton.....	510.00	0.33
Air and Water Pipes.—3 and 1 inch at 18c. and 5½ c. per foot.....	521.86	0.35
Horse feed.....	281.25	0.18
Material.—Steel, oil, tools, etc.....	693.00	0.45
Freights, at \$1.25 per 100 pounds.....	1,000.00	0.64
	\$19,239.85	\$12.40

With present reduced prices of powder, candles, etc., such a tunnel could now be run for \$11.25 or less per running foot.

From the upraise, 1840 feet in the tunnel, the channel was worked for a distance of 500 feet down stream to the west, and for a much greater distance up stream to the east. A branch tunnel was run at the same time under the easterly extension for a distance of 1300 feet, and two upraises made into the channel to be used as gravel chutes. The second of these is 3040 feet from the mouth of the tunnel.

This point reached, it was apparent that the gravel was not rich enough to warrant the extra expense of a bedrock tunnel and upraises. A slope was therefore raised from the end of the branch tunnel into the channel with a grade of 1 foot in 2½ to serve as a footway for horses. The upstream work in the channel was then continued as before, but without a tunnel underneath.

The Channel.—The gravel occupies a typical river-bed, with all its windings, bars, islands, pot holes, branches, etc., which only differs from the present rivers in its volcanic cement capping and somewhat greater grade. Its general course is southwesterly. It has a uniform grade of about 70 feet to the mile. Its bottom width is from 75 to 650 feet; average 200 feet. There have been encountered several islands, reaching heights of 12 or 14 feet above the average bed, and three large pot holes 80 to 120 feet long and 50 feet wide and 9 to 14 feet deep. As a rule, such holes are filled with large boulders and sand, and contain no gold; but in this case two of them contained rich gravel—one in its southerly half, the other in its northerly quarter, and the third was entirely barren. These holes were all found in hard bedrock. The soft rock is generally more uniformly graded, and has a level surface. Large trees, pines and cedars, almost unaltered, are of common occurrence in the volcanic cement immediately overlying the gravel, and this fact proves that this material was delivered in the form of a mud, and not as molten lava. Pine cones (apparently *Pinus Contorta*) and small branches have been found in the gravel. No fossil bones of any kind have so far been discovered.

The Bedrock.—The bedrock is principally metamorphic slate, often carrying large crystals of iron pyrites, and interstratified with calcareous schists, sheets of diabase and diorite and quartz veins. The general strike of the strata varies from N. 25° to 32° W., and the dip from 45° to 80° to the northeast.

The Gravel.—The gravel consists of boulders, principally of metamorphic schists and porphyrites with a very small percentage of quartz, intermixed with small pebbles and sand, and occasionally fine particles of iron pyrites. In some places the gravel of the old water courses is loose, with very little fine material between the boulders, and the latter are often covered with iron pyrites. As a rule, the gravel in the mine has a bluish color, which gave rise to the name of "blue channel;" but there are places where it is nearly black or red, and evidently discolored by percolating waters. When delivered to the surface and dried, it has more of a grayish color. The gravel is "free"—that is, it is soft enough to be washed without crushing, although blasting is resorted to as a means of facilitating extraction. The depth of the gravel is from a few inches to 16 feet, generally seven or eight feet in the center of the channel, thinning out to a mere seam on the rims. It is immediately capped with the volcanic cement, which forms a fine roof to work to. The overlying cement has a depth of 500 to 1000 feet, and is in the form of beds with intervening layers of gravel. The latter sometimes are also gold-bearing. The washed and rounded boulders are often two or three feet, and occasionally six or eight feet in diameter.

*The accompanying paper, of which an abstract was printed in the PRESS on Jan. 13, 1894, is a most important contribution to literature on the subject of drift mining. In response to numerous inquiries, and by permission of the Technical Society of the Pacific Coast (before which the paper was read), the full text is given.

Scientific Progress.

The Solar Corona.

Professor Schaeberle, of Lick Observatory fame, lectured at the University of California last week. "On account of the scope of the subject," said the astronomer, "I will have to limit myself to the corona of the sun. Before entering upon that, however, it will be necessary, to make my succeeding remarks intelligible, to review in a brief outline the principal points concerning the present knowledge of matter in space."

The lecturer then referred to the state of matter existing in the solar system, and gave in brief the present theory of the evolution of the system. The law of mechanics, that any contracting body of space will attain a rotary motion, was especially emphasized; also another definite law, that the angular velocity of rotation increases as a body contracts.

Then there appeared upon the screen a number of photographs and drawings of the sun, showing the spots, the protuberances and the coronal light. Many of these were from the Lick, others from the Harvard Observatory, and one from the University of Chicago.

"Formerly the corona could be seen and photographed only during a complete eclipse, but now, by an ingenious device, photographs showing the coronal streamers can be taken any time," said the lecturer. "These flames dart out sometimes 200 miles in one second. This motion can be seen frequently by the observer."

The speaker pointed out on all of the views of the sun's disc the excess of matter near the equatorial region, forming two indistinct bands surrounding the spheroid mass and at about 15 degrees latitude on each side of the equator. The excess of matter in the vicinity of the equatorial region is always to be observed of the corona.

About four years ago the mechanical theory of the corona and the spots was promulgated. This is, in substance, that all matter that goes to make up the luminous corona comes from the interior of the body toward the surface, according to well-known mechanical laws. This theory was hit upon by constructing a model of the sun and reproducing the conditions conceived as existing therein.

Professor Schaeberle then narrated in some detail the difficulties in the way of a successful trip to Chile one year ago.

"My trip to South America," said the lecturer, "was for the purpose of photographing the sun's disc to show the corona. I resolved to perfect some arrangement by which I could procure larger images. This was done by the aid of an improvised telescope, and the resulting views show coronal streamers, a phenomenon never before photographed."

"At this point I must speak of a theory of the coronal light, which has occupied considerable attention from astronomers—the magnetic theory. This explains the curves of the corona by supposing them to be due to magnetic forces organized about magnetic poles of the sun. The falsity of this theory is demonstrated by several of the photographs obtained in the Andes."

"Whatever theory is put forth to explain the sun spots and coronal border must rest upon laws of mechanics, and upon the further fact that the body in question is a rotating, incandescent liquid or gaseous sphere. Such a body is cooler on the surface than at the interior; hence it would have circulating currents from the interior to the surface. Now, if the body rotates also, then the currents moving outward would be deflected toward the equator with a gradual but continuous speed. Thus an equatorial band of gaseous or liquid matter will accumulate with two weak spots on each side of the equator. The continual

rotation of the body will cause these weak and strong spots to change relative positions constantly, and this explains entirely the periodicity of the sun eruptions causing the coronal streamers. This condition of things must obtain in every rotating, incandescent, gaseous or liquid spheroid, whether sun or some other body."

Attempts at Cloud Photography.

Good photographs of clouds, especially of the delicate white plumes of cirrus, would be of great use in certain lines of meteorological study, apart from their artistic value. It has been hard to secure such pictures, however, owing to the fact that the blue sky has the same actinic effect upon an ordinary plate that the white vaporous masses produce, so that no such contrast is obtained photographically as is apparent to the eye. Various means resorted to, in order to obviate this trouble, were recently discussed in *La Nature* by M. A. Angot, his essay having been originally presented to the Paris Physical Society.

One fairly successful plan is to ascend a mountain, where, owing to the greater purity of the air, the sky forms a darker background than at lower levels. This is an expedient not in every one's reach, however. Prof. Riggenbach uses a diaphragm with a very small perforation in front of his lens, and makes a short exposure. This gives only a faint image at first, but a perceptible contrast; and then the process known to photographers as "intensification" is resorted to. But there is danger of ruining plates by this operation. Another method tried by the same expert was to polarize with a Nicol prism the light entering the camera. Only a part of the rays proceeding from the sky would then get access to the plate, while the light from the clouds would remain unaltered.

A plan employed by M. Angot himself takes advantage of the fact that the clouds are rather rich in yellow and green rays. He places a "color screen" before his lens that will readily transmit such rays, but exclude blue and violet. This is attended with excellent results when the clouds are stationary. As yellow and green light is very slow in its action, prolonged exposure is required; and if the clouds be pure cirri, or cirro-cumuli, a little movement will impair the sharpness of their detail and make a sad blur. In this work, M. Angot prefers a liquid screen. An almost saturated solution of bichromate of potash, to which a few drops of hydrochloric or sulphuric acid have been added, or saturated solutions of bichromate of potash and sulphate of copper in the proportion of three of the former to one of the latter, may be used, between glass plates having parallel surfaces, and about five or six millimetres apart.

The Planet Jupiter.

Prof. E. E. Barnard lectured recently in Pioneer hall, S. F., under the auspices of the California Pioneer Society, on "The Planet Jupiter and His Satellite System." He described the peculiar features of the planet as seen through the telescope. Its surface is in variable condition and is changing constantly. When seen through the telescope it is a disk about as large as the thumbnail.

After detailing the belt markings and the spots on the northern and southern hemispheres, he described the large red spot which in 1878 appeared south of the great equatorial belt, elliptical in form and sharply defined. Ordinary markings on Jupiter are transient, but this red spot was the most prominent object on the planet for three or four years. It was about 8000 miles wide and 30,000 miles long, its area being equal to the surface of the earth.

Science has not learned what this spot was. The accepted theory is that the planet of Jupiter is a hot body—not heated to the

point of incandescence, but warm enough to convert all the water on its surface into vapor, which fills the atmosphere with a dense strata of cloud surface. This is changing all the time. The presence of the red spot was perhaps due to some sort of an eruption, which dissipated the clouds; that is to say, made a hole through them, and the spot was the visible surface of the planet not obscured by the steam.

In the equatorial belt every object is moving. The cloud forms move from west to east around the planet, making the circuit in 45 days. Roughly estimated, their velocity is four miles a minute, four times as fast as a hurricane on earth. The greatest motion of the clouds is not on the equator belt, but in a very narrow zone in 21° north latitude.

The four bright satellites of Jupiter are in every respect similar to our moon, revolving around the planet just as the moon revolves around the earth, except that their velocity is greater. The closest makes the circuit in 42 hours, the most distant (1,600,000 miles) in 17 days, while our moon takes 27 days to get around the earth. The reason they move so rapidly is the greater attractive power of Jupiter. Its attraction on the first satellite is 300 times greater than that of the earth on the moon.

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Mechanical Progress.

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A bold scheme for obtaining mechanical power for industrial purposes has lately attracted attention in England. It contemplates the construction of a dam fifteen miles long from the northeastern coast of Ireland across "North Channel" to the extremity of Cantire, Scotland, and putting in several gates and water-wheels, to be worked by the tide. Owing to the greater depth of the ocean than of the Irish Sea, and to the freer course afforded west and north of Ireland, the tide comes up from the South Atlantic by that route, and flows southward through the passage just mentioned long before it can get up there on the east side of the Green Isle. Moreover, the Gulf Stream, or rather the drift from it, bathes the northern part of Great Britain more freely than the southern, and a portion thereof is diverted southward by the Scottish coast, so as to make a continuous current, it is said, flowing down the North Channel. Here is a great deal of power going to waste, and it is not a senseless proceeding to consider the practicability of utilizing it somehow. American enterprise at Niagara has set the whole world thinking of such matters.

The depth of water, says W. Lodian in *The Electrical Engineer* (New-York), is 474 feet in mid-channel; but most of the way it is much less than this. The proposed "isthmus"—for that is what the engineers call it—would be about three hundred feet wide; and the material for it, it is thought, might be obtained from the high bluffs at the Irish end. The estimated cost is \$10,000,000; and the time named as necessary for construction is three years. Mr. Lodian neglects to say how much of head there is here; but the current flows at six miles an hour most of the way across, and at some places even faster. It is taken for granted that the power developed by this means would be converted into the form of electricity for transmission; but there is some question as to the localities in which it would be used. On the Irish side of the channel there are no large towns near at hand. Dublin is 126 miles away, and London 365; Glasgow, in a bee-line, is 75 miles distant, and Edinburgh about 50 more. Mr. Lodian thinks it would be more sensible to build this junction between Dover and Calais; for a viaduct as well as a dam is desirable at that point; and it is much nearer London. But such an obstruction in the English Channel, even with proper gates, would interfere with shipping.

Horse-Power.

Horse-power measures the rate at which work is done. One horse-power is reckoned as equivalent to raising 33,000 pounds one foot high per minute, or 550 pounds a second. In measuring the work of a horse the estimates of the most celebrated engineers differ widely from each other: Boulton and Watt, basing their calculations upon the work of London dray horses working eight hours a day, estimated it at 33,000 foot pounds per minute. D'Aubisson, taking the work done by horses in whips at Freiburg, estimated the work at 16,440 foot pounds working eight hours a day. Under similar circumstances Desaguliers' estimate was 44,000, Smeaton's 22,000, and Treadgold's 27,500 foot pounds. Horse-power is called nominal, indicated or actual. Nominal is used by manufacturers of steam engines to express the capacity of an engine, the element being confined to the dimensions of the steam cylinder, and a conventional pressure of steam and speed of piston. Indicated shows the full capacity of the cylinder in operation without deductions for friction, and actual marks its power as developed in operation involving elements of mean pressure upon the piston, its velocity, and a just deduction for the friction of the engine's operation.

The original estimate of Watt is still counted a horse-power. The general rule for calculating the horse-power of a steam engine is to multiply together the pressure in pounds on a square inch of the piston, the area of the piston in inches, the length of the stroke in feet and the number of strokes per minute. The result divided by 33,000 will give the horse-power.

Steel Boiler Tubes.

We must all admit that the use of the steel boiler tube is abreast with advanced scientific construction and experiment, says the *Boiler Maker*. The advocates of iron for boiler tubes have been very resolute and determined in their opposition to the introduction to use of steel, but practically the same opposition existed to the introduction of steel boiler plate when the latter began to supplant flange iron.

We heard the idea of using steel for boiler plate ridiculed on all sides, but flange iron has been laid on the shelf, and a specification for a steam boiler containing the words "flange iron" is of very rare occurrence. In this searching and crucial age the best survives, and steel boiler flues have come to stay. All acknowledge that there are poor steel tubes and poor iron tubes, but we claim superiority for the good steel article for many reasons.

They can be more evenly made. They can be welded more perfectly, and they are stronger and cheaper. More than this, the steel flue is rolled truer to gauge, and can be more easily placed in the boiler head. The well-worn argument against the steel flue, viz., that it pitted sooner under the action of water, has been contradicted by the best of authorities.

The New York Railroad Club discussed the subject thoroughly at their meeting last fall in the presence of some of the most noted representatives of iron and steel industries of England and Germany. The conclusion reached was that one material showed to better advantage in some waters, the other in other. This would seem to silence at least the general charge against the steel tube as regards pitting. As to the relative strength of steel and iron in boiler flues, it may be said that steel is almost always specified whenever a great strain is to be withstood, thus demonstrating a higher degree of tensile strength.

Paper Tires for Bicycles.

The pneumatic tire for bicycles is unquestionably one of the greatest improvements ever made in those vehicles. But its cost is a serious matter. Rubber is at present the only material in use for such tires. Leather has been tried, but it does not seem to give satisfaction. Paper, however, has recently been the subject of experiment for this purpose; and *The Paper Trade Journal* reports that success has been attained. In fact, it is asserted that two paper tires will, on the machine, cost only two-fifths or one-half what a pair of rubber tires cost; and, being less yielding, the new material may last much longer. Its champions claim that it will not be so easily cut or punctured by glass or sharp stones, and will not break from constant squeezing and inflation so soon as rubber.

Unfortunately, the names of the inventors are not supplied by our contemporary, nor is it at liberty to mention the ingredients incorporated with the pulp for such tires to impart toughness and elasticity. But *The Journal* adds these particulars: Drawing paper out into a tube is an art already known to manufacturers. The ends of a tube may be united by shaving off the inside of one and the outside of the other, and using a special elastic, watertight glue where one overlaps the other. The hair used in place of interior linings is forced into the hollow of the tube before the union is made. A special instrument is used so that the packing is uniform.

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Back of these achievements I, adds Mr. Houston, discern a practical apparatus for seeing through a wire, that is, a device for looking into a receiver at one end of a metallic wire and seeing therein a faithful reproduction of whatever optical images are impressed on a transmitter at the other end, even though thousands of miles intervene. I see the possible use of the step-down transformer for the preparation of a road bed or road surface by the vitrification of clay or other suitable soil, by the intense heating power of enormous currents of electricity.

Electricity and High Temperatures.

A strong claim is now made that the application of electricity to the production of high temperatures has been developed to a remarkable degree by Henry S. O'Neill, of Boston, the result of whose recent researches, it is predicted, will create a great interest, at least among scientific men, says the *Chicago Journal of Commerce*. The furnace, which is 13x5x4½ inches in size, consists of three cylindrical shells, one within the other, with non-conducting walls and spaces between each. The inner wall is composed of diatomaceous or infusorial earth and asbestos porcelain bound together. Against this wall and between it and the one adjoining it, is an inch layer of infusorial earth. The next wall is of magnesite. Between this and the outer wall, which is composed of kaolin and fossil meal, is another layer of powdered calcined magnesite. In the furnace, with an outlay of energy not exceeding 2000 watts, a heat is said to be produced that readily vaporizes carbon, the critical temperature of which cannot be less than 6000 degrees Fahrenheit.

An Electric City.

Great Falls, Mont., appears fairly entitled to distinction of being called the Electric City. At Black Eagle Falls, three miles above the town, an immense dam has been thrown across the Missouri. Not only are the street cars propelled and lighted by electricity from the power houses, but they are heated as well by electric radiators placed in each car. Elevators, printing presses, cranes and all kinds of machinery are operated by the ubiquitous force. There are automatic excavators, electric pumps and electric rock-crushers. A not uncommon sight on the street is a mortar-mixer attached to an electric wire leading down from a pole. The restaurants cook by electricity, the butcher employs it to chop his sausages, the grocer to grind his coffee and the tailor to heat his goose. The subtle fluid is a

welcome blessing in every home; the housewives run their sewing machines and heat their flatirons by electricity; they have electric broilers and teakettles, and they bake their cakes in electric wooden ovens that can be set away on a shelves like paste-board boxes.

Heating Iron in Cold Water.

It would now seem as though the common, but time honored blacksmith's forge and all other kinds of fiery furnaces, will become extinct and live only in the memory of a rapidly receding past says the *Mechanical News*. The forge and furnace of the future will consist of a lead-lined glass or porcelain vase or cupola filled with cold acidified water, to which is connected a strong positive conductor. A pair of tongs with insulated handles attached to a flexible negative conductor are also provided making this new forge and outfit complete.

The smith seizes the piece of iron he wishes to manipulate with the insulated tongs and plunges it into the sour water which begins to boil and bubble the instant it comes in contact with the iron which, in a remarkably short space of time, turns to a red and then to a white heat ready for the work of the smith.

So rapidly is the heating done that the water and the portion of the iron not immersed in the water, is but slightly warmed.

The principle involved in this process is the same as in incandescent electric light. Resistance produces the light and heat. It is said that enormous heat can be produced by this method, much greater than is necessary to extract the iron from the most refractory ores.

Like all, or nearly all, of the late practical applications of electricity, this discovery will no doubt lead to marvelous results in the perfect and rapid handling of heavy iron and steel plates and bars that have to be hammered and welded; and more valuable still for tempering purposes as the required heat for the immersed portion can be quickly obtained while the remaining portion is kept comparatively cool, which cannot be done by present methods. By electricity we live and move, and by electricity some of us die.

Electric Fishes.

The fishes known to possess electrical organs number about fifty species, but only in five or six have these organs been carefully studied, says *Electricity*. The fishes are not confined to one class or group, and inhabit both fresh and salt water. The best known are various species of torpedo (belonging to the skate family), which exists in the Mediterranean and Adriatic seas; the gymnotus, an eel of the lagoons in the Orinoco region of South America; the malapterurus, or thunderer fish of the Arahis, which is found in the Nile and other African rivers; and various species of skates of the seas of northern Europe. The electrical organs belong to two distinct types, that of the torpedo, gymnotus and skate being closely related in structure to the mussel, while that of the thunderer fish has a greater resemblance to a secreting gland. Both types are built up of a vast number—lately estimated by Ewart at as many as 250,000 in a torpedo—of minute elements, each supplied with a nerve fibre.

Electric Launches in Venice.

A scheme is afoot for introducing electric launches on the canals in Venice. The Electric Launch and Navigation Company, which supplied the electric launches at the Chicago Exhibition, is said to have disposed of a number of launches to a company, which will put them in service on the Venice canals. The launch is not picturesque and there is no glamour of richness about it; but it will probably do away with the gondola, as cabs and omnibuses did away with Sedan chairs,

Useful Information.

The Time Without a Watch.

Actual and repeated experiments have shown, says *Tid-Bits*, that the nearest hour of the day or night may be ascertained in the following curious way:

Make a small running loop in a piece of sewing thread about a foot in length, place a shilling [a quarter] in this loop, see that the coin is accurately bisected by the thread, and then draw the loop tight up, so that the shilling is firmly slung at one end of the thread. Put on a solid table a glass tumbler with a fairly wide mouth. Rest your right elbow on the table in a firm and easy position so as to avoid any shakiness in your hand, hold the other end of the thread between your first finger and the "ball" of the thumb (i. e., the fleshy top joint of the thumb), so that the thumb nail is undermost and a few inches above the middle of the mouth of the glass.

Now, if you keep your hand quite steady, the movement of the coin (which is hanging inside the tumbler), will become less and less until the shilling is motionless. Then, in half a minute or so, a very slight and regular vibration will commence, the coin oscillating from side to side like a pendulum, and gradually increasing the length of movement until it gently strikes the side of the glass. The strike goes on in the most regular and automatic way—first on one side of the glass and then on the other, until, say, eight strokes have been struck; the vibrations of the coin then diminish in length until the suspended shilling again becomes motionless and hangs in the middle of the tumbler. You look at your watch and find that 8 o'clock is the nearest hour.

I have tried this over and over again, deliberately setting about the experiment without bias or in any intention of influencing the swing of the coin, and also being ignorant of the time, and when my hand has been steady the right time has invariably been struck.

There is something very curious about this phenomenon. Whether the thread is influenced by the pulse in the "ball" of the thumb, or whether there is some unconscious transference of "intention" from the brain to the thread, I do not know; but in any case, the matter is sufficiently interesting to be worthy of a critical test by persons who will carefully and without bias carry out this singular experiment of telling the time.

The Silk-Spinning Spider.

The silk spider of Madagascar forms the subject of an interesting article in *Die Natur*, by Dr. Karl Muller. Its native name is Halabe, meaning great spider. This Halabe, or *Nephila Madagascariensis*, spins threads of a golden color and strong enough, according to Maindron, to hang a cork helmet by. The female spider may attain a length of 15 cm., while the male does not exceed 3 cm. A single female individual, at the breeding season, gave M. Camboue, a French missionary, some 3000 m. of a fine silken thread during a period of about 27 days. The thread was examined with a view to creating a new industry. Specimens tested at a temperature of 17° C. showed an elongation of 12.48 per cent under a weight of 3.27 gr. Small textures woven of these threads are actually used by the natives for fastening flowers on sunshades and for other purposes.

To Beat the Ferris Wheel.

"The Gigantic Wheel," to be erected at Earl's Court, will, says *Invention*, be 50 feet larger than the great Ferris Wheel at the World's Fair, Chicago, its summit being 300 feet above the ground. It will be fitted with 40 cars, each holding 40 persons, and will

revolve at a very slow speed, about equal to the second hand of a watch. The round trip will occupy 20 minutes, with five stoppages, there being landing stage accommodation for filling and emptying eight cars at the same time. The cars will be luxurious. There will be novel opportunities for observation and for enjoying tea parties in the air.

To Measure a Room for Wall Paper.

To determine the number of rolls of paper to cover the walls of a room, measure the circumference, from which deduct the widths of doors and windows and divide the remainder by 3.

Example.—Let us suppose a room 12x16 feet, which has two doors and two windows, which average 4 feet wide:

$$\begin{array}{r} 12 \times 12 \times 16 \times 16 \text{ equal } 56, \text{ circumference.} \\ 4 \times 4 \text{ equal } 16, \text{ doors and windows,} \\ \hline 56 \\ -16 \\ \hline 40 \\ \hline 13\frac{1}{3}, \text{ or say } 14 \text{ rolls.} \end{array}$$

This rule is calculated for a room of not less than 10 or more than 12 feet in height. For a room under 10 feet high, having a frieze, say of six inches, we will proceed as before with the measurement of the room, deducting the widths of the doors and windows. But in this case multiply the remainder by two and divide by 15; for this reason, that we can cut five lengths out of a double roll, which, placed side by side on the wall, cover a space 7 feet 6 inches from the ceiling, and instead of multiplying by 7 feet 6 inches we multiply both by 2.

Example.—Take a room 14x14, with two doors and windows:

$$\begin{array}{r} \text{Circumference of room} \dots\dots\dots 56 \\ \text{Less for doors and windows} \dots\dots\dots 12 \\ \hline 44 \\ \hline 2 \\ \hline 15\frac{1}{3} \end{array}$$

Say 6 double rolls, or 12 pieces. Of course if a dado is required its width will determine how much paper will have to be deducted. — The Carpet and Upholstery Trade Review.

Soylla and Charybdis

The whirlpool of Scylla and Charybdis are situated in the Strait of Messina, between Sicily and Italian Apulia, and although dangerous to the mariner of the ancient world, are not very formidable in the present day. The whirlpool of Scylla lies at the base of the cliffs on which stands the village of Scylla. The circling waters have worn the cliffs into caves, which in heavy seas emit sounds like the harking of a dog. Charybdis is near the port of Messina, nine sea miles from Scylla, and, according to Signor Spallanzani, is 500 feet deep. The old danger of sailing between them has recently been explained by M. Keller, an engineer, who shows that the currents in the strait depend both on the tide and wind. The currents are strong because the tide is low in the Ionian sea when it is high in the Tyrrhenian sea and vice versa, and whirlpools, more or less energetic, are formed at various points of the strait. When the wind is from the south-east the waters pour from the Ionian sea into the strait and form whirlpools north of the port of Messina, and also near Faro, where ships at anchor are sometimes carried out to sea and borne by the current on the rocks of Calahria, toward the point of Pezzo, a little further off than Scylla. It is probable, therefore, the ancients meant by Charybdis the casual whirlpools near the port of Messina, and by Scylla those at Point Pezzo. Between these two points the currents are extremely rapid, strong and variable. The danger is really serious for sailing vessels, which were all the ancients had, and an experienced pilot might, in avoiding Charybdis, find himself in Scylla.—London Globe,

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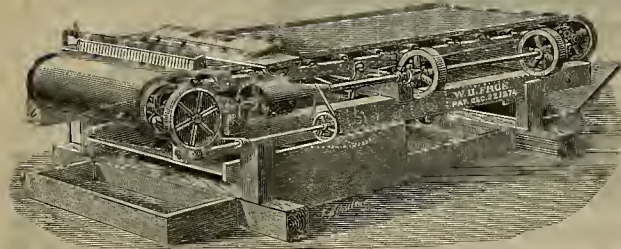
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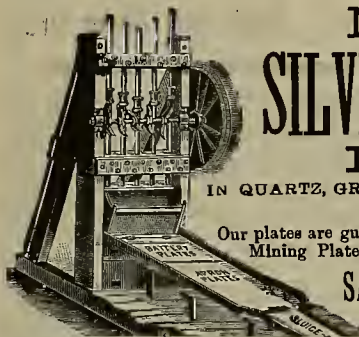
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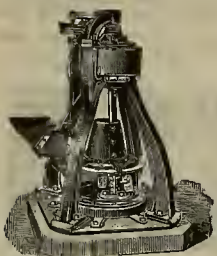
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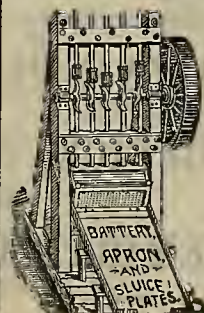
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Mining Summary.

The following is mostly condensed from journals published in the interior, in proximity to the mines mentioned.

CALIFORNIA.

Amador.

OLD MINE TO BE OPENED.—*Record*, Mar. 1: The report is current and seems to be well founded, that an old, well-known mine is to be opened here this spring on an extensive scale. New men with abundant capital and large mining experience will assume control of the undertaking; in fact, it is said they belong to the old Comstock crowd who, in time past, made things hum in that historic camp. The same parties are said to be negotiating for still another mining property in this immediate vicinity.

There is every reason to believe that a great mining boom is in store for Sutter Creek district. While others were growling and accomplishing nothing, a few of our citizens have succeeded in interesting capitalists in various enterprises that will, when consummated, make Sutter Creek the most prosperous town in the county.

A FAVORABLE INDICATION.—*Record*: At the South Eureka mine the prospecting drifts and crosscuts on the 800-foot level are still being extended. So far no permanent body of ore in paying quantity has been developed. This week, however, a strong stream of water was encountered while the men were drilling in the east north crosscut, 180 feet from the main shaft. When the drill was withdrawn the water was thrown out by the pressure a distance of 30 feet. The flow was so great that for a time it required the full power of the pump to handle it. Old miners look upon this as a very favorable indication and seem to think there is a large body of ore near at hand.

THE WILDMAN MINE.—*Record*: At the Wildman mine, on both the new 1200 and 1300-foot levels, at a distance of 55 feet south of the main shaft, a heavy body of quartz has been struck, the ledge being eight or ten feet in width. The rock in the face is of low grade, but a portion of it looks promising and there is strong hope that, as the drift is extended, it may develop into a handsome-paying body of ore. After an idleness of three months the mill, with its 30 stamps, began pounding away on rock Wednesday night.

THE HECTOR MILL RUNNING.—*Record*: The Hector (formerly the Mahoney) mill started up 20 stamps on Wednesday, on rock taken out by Messrs. Campbell and Bean. They now have about 250 tons in the bins and are extracting, with three men, some 20 tons per day, so that the 20 stamps are likely to be kept busy for some time. They are working under a tribute arrangement and are making good wages, so we are informed.

Butte.

THE BEEHIVE MILL.—*New Era*, Mar. 1: G. W. Davies has returned from Mt. Hope, where he has been doing the mason work for the Beehive mill. He reports having finished his job, and that the work on the mill is being pushed with all possible speed. He is unable to fix upon a date when the mill will be completed, as bad weather may delay the time, but he thought that in four weeks the mill would be dropping its stamps. He says the mill is very substantially built, and when completed will contain all the latest improvements for saving gold.

Colorado capitalists have bonded the quartz ledge recently discovered by S. H. Hurley, near his hotel, at Hurleton.

The Burroughs Company is making arrangements to put a stamp mill upon their ledge on McCabe's creek. They have not decided whether to build a five or ten-stamp mill at present, but as the ledge is quite large, it will probably be that a ten-stamp mill will be decided upon.

ELECTRIC PLANT.—*Oroville Register*: Major Frank McLaughlin, general superintendent of the Banner mining property, received this week 70,000 pounds of freight, which included an immense electric plant for running the Banner mill and hoisting works, for lighting the mine and for furnishing light and power in Oroville. The plant will be located at the foot of Table Mountain, where the great ditch of the Thermalito Company has a fall of 142 feet. The water will be used to develop the electrical power, yet will not be lost, but will be brought on for irrigation purposes as in the past.

Del Norte.

FOR BEACH MINING.—*Del Norte Record*: Another gold-saving machine will be put up on our beach soon. The parties who have a new process are here and expect a machine and engine soon, when they will endeavor to extract the fine particles of gold from the rich black sand of our beaches. Numerous inventions have been tried, but so far without success, yet it seems reasonable that some day the right machine will be produced, and this latest invention may be the one. A late edition of the *MINING AND SCIENTIFIC PRESS* contained an article on a new gold-saving machine and the one that is to be set up here is probably the same. An extensive plant was brought here last spring for extracting magnetic iron and gold from the sand, and put up a few miles below town, but for some reason was never put in operation, but may be before long.

Calaveras.

THE NORTH STAR HYDRAULIC.—*Chronicle*, March 3: Monday last we paid a visit to the North Star Hydraulic, which is situated in Happy valley, about a mile from this place. The work of fitting up the claim, which was done under the supervision of C. M. Burleson, Esq., of this place, was commenced the 15th of

last November. There was 3200 feet of a two-foot flume put in, a fine office and a blacksmith shop erected, and in fact everything in and around the mine put up in first-class working shape. About twenty days ago water was turned on, since which operations have been going on steadily. The water for hydraulic purposes is taken from the Mokelumne and Campo Seco canal, under a 200-foot pressure; 300 inches of water are used, which is conveyed to the mine through an 11-inch pipe and directed against the bank through a 4-inch nozzle. A large derrick has been erected in the mine for the purpose of banding the rocks, and a power house, some distance from the mine, is now in process of construction. Operations at the mine, which are being prosecuted night and day, are under the supervision of J. K. Carpenter, Esq., and the working force consists of twelve men. The gravel bank prospects well and all indications are that when the cleanup is made it will repay the owners for all outlay made.

El Dorado.

FOUND GOLD.—*Republican*: J. C. Murphy of Kelsey has been finding some coarse gold near that place recently. Two pieces that have been exhibited weigh about \$125. One is almost pure gold and nearly round. The other is about one half quartz and oblong. They are from pocket seams but have been somewhat worn by water and debris.

The Esperanza mine near Garden valley has been reopened and the water pumped out down to the 190 foot level. Some of the rock will be taken out and crushed at the mill on the Lone Jack mine. The Esperanza is about a mile south of the Taylor mine and on the same general formation, so there is a good prospect that it may develop into an equally valuable property under good management and the requisite capital.

Kern.

RAIN IN THE GOLEA FIELDS.—A business man who had been all over the mining camps at Redrock, Goler and Summit a few days ago, reports to the Los Angeles *Herald* as follows: A good deal of rain has fallen the past two weeks and the ground in all the camps is soaked. In consequence of this nearly all the miners are idle at present. The gold is taken out by the dry-washing process, which can be done only when the dirt is in a dry, powdery condition. Most of the claims yet worked are in shallow ground, which even moderate rainfall wets to bedrock. A few claims are in ground where bedrock is ten feet or more below the surface. In these claims dry dirt is found, and there miners have been working without any interruption by rain. In all these claims men are making good pay. The visitor who makes this report says he learned that at Redrock, Goler and Summit there are men earning from \$4 to \$10 per day. It will take a few weeks of dry weather to put the ground in condition to push work as it was before the late rains. San Francisco parties are negotiating for the purchase of most of the claims at Redrock.

BOUGHT A MINE.—*Bakersfield Californian*:—The Talc gold mine was recently purchased by George W. King for himself and other Denver capitalists. It lies about two and one-half miles northeast of Woody Postoffice and is a promising gold property. The mines in that locality have been worked from an early date and have yielded a great deal of very rich quartz.

Mono.

ON UNIVERSITY ORE.—*Bodie Miner*: The Miners' mill is now running on ore from the old University mine. There was something over 100 tons of ore at the mill when operations were begun, and when the roads get in condition Dick Leale will commence hauling more.

Nevada.

MINING SURVEY.—*Telegraph*: On Monday a survey of the Granite Hill mine was completed and all the outlines of the ground will soon be outlined on a map. Not only has a survey of the mine been made, but also a survey for a mill site as the company intends at a very early day to erect a mill upon its property. The prospects at the Granite Hill justify any outlay which mining men choose to make.

STRUCK THE LEDGE.—*Transcript*, Feb. 27: John Campbell and son of Piety Hill have struck a quartz ledge in their residence lot, from which a crushing of rock has been taken.

Teams are hauling quartz from the Reward mine to the Nevada county mill to be crushed. Underground work at this mine was recently suspended, but we learn it is only temporary and that the shaft is soon to be sunk deeper.

The Grant mine at Canada Hill continues to yield fine quartz and the ledge is looking well. Messrs. Veal and Mosby, the lessees, are making the mine pay.

Ellison, Tremaine and Chappell expect to strike rich gravel soon in their claim on Selby hill. They have been working a long time and indications are that the main channel which they have been running for is near at hand.

PAID BRO.—*Union*: Three or four loads of ore from the Rose Hill mine, owned by Richard Lawrey, have just been crushed at Gauthier's mill. The yield was \$65 per load, which is very satisfactory indeed.

THE DELHI MINE.—*Transcript*: The Delhi Mining Company has been reorganized and, as now constituted, will soon begin work at the mine on an extensive scale. All the necessary machinery will be procured with which to open up and develop the mine on a larger scale than ever before, and a big crew of men will be employed. Work will begin next week. Chris Mallon, who has been superintendent of the Delhi so long, will be superintendent under the new company. Messrs. McMurray, Hamilton and Love, the principal owners, were here last week and arranged for resuming work on the mine which, it is believed, still contains a

vast amount of hidden treasure within its depths, and will be found to be as rich, if not richer, than ever before.

RICH STRIKE AT THE ODIN.—*Transcript*, Mar. 5: The most important strike ever made in the Odin gravel mine occurred on Saturday last. Some time ago the miners came upon an ancient waterfall, 17 feet in height. After drifting through 14 feet of sand a fine body of rich gravel was encountered Saturday, some of the prospects from which went as high as \$2 to the pan. This strike is very encouraging to the owners of the Odin, and corroborates the theory held by Superintendent Hesse that there must be an extensive body of gravel in the company's ground. Its proximity to the old Nebraska mine warrants the belief that much of the gravel will prove to be very rich.

BIO PROPOSITION.—*Herald*: There is a big mining proposition under way in Washington district which angers well for that section. Henry Kohler, the pioneer merchant, and certain others, have a claim on Canyon creek, which is on the same extension as the Yuba, Lindsey, California and others known to be good mines. The prospects are that considerable work will be done there this year.

THE TELEGRAPH MINE SOLD.—*Grass Valley Union*: Jacob Weissbein has purchased the Telegraph mine, which adjoins the W. Y. O. D. on the north, from James Glasson. The mine has been worked to but a superficial depth, but its favorable location makes the property valuable.

FOR DRIFT MINES.—*Herald*: A promising section of this county is Moore's Flat and Graniteville. It is full of mineral, and what has been taken out seems to be but a fraction of what is still in the ground. There was considerable activity in that neighborhood last summer, and the indications are that far more extensive operations will be seen next summer.

The late D. R. McKillican's property, for one, is to be worked if reports are true. The big gravel claim near Moore's Flat has been purchased by a company of New Yorkers, and a drift will be run into it from the Moore's Flat side. J. H. Cunard of Bloomfield has been engaged to superintend the operations, and it is said to say no better man could have been secured.

THE JACK RABBIT.—*Transcript*: J. B. Storch, superintendent of the Jack Rabbit mine, has issued a report on the condition and prospects of the mine. We make the following extracts: "Leave the theoretical consequences aside, which, according to the formation the Jack Rabbit mine is located on, are extremely encouraging, and judging after the practical experience on the developments from the numerous prospect holes, cuts and drifts on the surface, down to the lower and finally to the lowest level, 183 feet underground, you will observe a gradual improving of the quartz stringers the deeper you come, increasing in color and width. You will find that a number of minute quartz stringers are constantly uniting to one ribbon of considerable size, and you will find that the white, dead crystalline, sugary color changes into gray metallic colors, finally beginning to be uniformly infiltrated with gold and other metallic gold and silver-bearing sulphurets, etc. And you will find all over the Grass Valley district that exactly the same indications guided the miners to a rich strike in all the dividend-paying mines. Now come to a common-sense conclusion. Taking everything into consideration, what theory, practice and local experience teach, you will come to the conclusion that the Jack Rabbit mine is entitled to the same expectations as any other well-paying mine in the Grass Valley district, when the line of the settled formation will be reached—therefore, the plan of operations has to be changed."

WILL ERECT PUMPING MACHINERY.—*Transcript* March 3: Fairweather & Co., who are operating a quartz mine near North Bloomfield, are taking out fine rock and their prospects are highly encouraging. The shaft is now below water level and it is necessary to have a pump to handle the water. The owners are arranging to put in the needed machinery.

Riverside.

AT THE GOOD HOPE.—*Riverside Enterprise*: The grading for the new mill to be erected on the Good Hope mine has been completed and lively times may be looked for there before long. It is stated on good authority that the new mine will employ at least 300 men when in full operation. J. K. Estep, a representative of the Union Iron Works of San Francisco, is at the Good Hope ready to begin the erection of a new mill, which is being built by the iron works and which is expected to arrive soon. The owners of the Snow Bird mine, which is located near Winchester, are considering the question of the erection of a stamp mill. Report comes that both the Rose mine and the Christie mine, which latter is an extension of the Rose, are showing up in good shape of late. It is said the Rose is paying handsomely now, although the owners, who live in this city, do not talk much of the mine.

San Bernardino.

AT THE CAMPBELL MILL.—*Shaft*, March 2: Mr. Stanley, Mr. Campbell's right-hand man, and Chief of Construction Rich, say that stamps will commence dropping in the Campbell mill next Monday.

At the Boomerang the main shaft is now about 50 feet below the lower level, and is being sunk rapidly by three shifts of good men. The vein is looking splendidly all the way down, and considerable water is being found. Although Mr. Campbell has not stated his intentions in the matter, it is supposed that he will continue to sink his shaft as fast as it can be done until the 500-foot level is reached, and perhaps farther.

The mill at the Bronze has reached that point

where a good deal of time can be put in without any apparent result from hour to hour. But it is nearly ready for business, and the placing of the machinery will soon be done. It is very likely that by March 10th ore will be worked in this mill. Everything about it will be first-class, and it is a foregone conclusion that the best of results will attend the working of the ore.

At the Bronze the chief feature during the past week was the striking of a quality of ore that runs much higher than that which has been taken out, rich though it has been. This strike was made at the very lowest point in the vein, and although the winze has been sunk still farther the quality remains the same. The character of the rock is not changed, it still remaining a pure quartz, just as it has been for a long time. This new ore is very rich and the ledge is of good width.

The pumping of the water out of the St. George still continues, and will soon be done. Progress is retarded by the necessity of re-timbering the shaft, the work being poorly done before. An interesting event in the work was the uncovering of a seven-foot vein at the 250-foot level by the falling away of the wall. This probably insures the sale of the mine to Mr. Schofield's company; and, if the purchase is made, it will be worked for all there is in it, which is just what we desire to see. That property is too valuable to lie idle.

NEW GLADSTONE CAMP.—*Needles Eye*: The rich strike made by Patrick Dwyre and James Walker, 26 miles west of Fenner, has aroused considerable interest in Needles. Last week Judge West, Pat Flynn and others from this point, giving it the appropriate title of Gladstone. On Monday F. C. Robie, Ben Harshberger and William Hunt left for the field. They are seeking mineral locations. The strike is unquestionably a phenomenal one. The ore from one of the claims runs high in gold and silver. The ledges run from a few inches to two feet in width, and are rich in free gold. Mr. Dwyre has made five trips to the place before, but has always been unable to find the ledges, as they were covered with dirt. The place is 26 miles west of Fenner, 11 miles southwest of Providence, and about 50 miles south of Vanderbilt. On last Saturday a good strike was made by Charles Lingo and J. L. Sullivan, 10 miles south of town. They brought in some very rich pieces of float, and on Monday returned to the scene. They are confident that they have struck it rich.

Sierra.

RICH ROCK.—*Downieville Messenger*: A piece of very rich rock the other day was taken from the bottom of the shaft at the Gold Bluff mine. The rock is of the ribbon variety and fairly "lousy" in free gold and rich sulphurets. All parts of the mine are showing up much better than ever. The several ledges are widening out and the main ledge, on which the shaft is sunk, is growing richer as it goes down.

Shasta.

SUCCESS AT BULLYCHOOP.—*Courier*: Mr. R. G. Hart says that tunnel five on the Texas and Georgia in Old Diggings struck the chute 150 feet below tunnel four on the 22d nit. The vein at this depth is a whopper, and the ore mills first-rate. He is now arranging to add a leaching and chlorinating plant to his mill on this mine, and has ordered the brick and mortar for the roasting furnace of Holt & Gregg. This addition will be the same and of like capacity to that now successfully working at Bullychoop. In speaking of Bullychoop, he says the reduction plant is now successfully working the refractory ore of that great mine. A Frieburg graduate is now handling the chlorinating plant there and is working the ore up to a high percent. Bullychoop from now on will yield big dividends. The roasting furnace (a reverberatory) has a capacity of five tons, but they are putting through but three and a half tons at present. This is because the furnacemen are not yet sufficiently trained to run it to its full capacity. However, the plant is now yielding a net profit of \$125 a day. Mr. Hart says the cost of mining, milling and chlorinating at Bullychoop now costs just \$3.50 per ton of raw ore. This is an important fact for mine-owners of Shasta to make a note of. The milling and concentrating plant at Bullychoop handles 30 tons per day, and the whole plant represents an expenditure of about \$20,000. The mine is such a large producer of good ore that the capacity of the plant will probably be double in another year.

Trinity.

FOUR-FOOT LEDGE.—*Trinity Journal*: It is reported that a four-foot ledge of good rock was struck in the Yellowstone mine, East Fork district, this week.

Siskiyou.

ABUNDANT WATER.—*Yreka Journal*, Feb. 28: The miners at Hawkinsville are pushing their mining operations vigorously, with an abundance of water to keep sluicing until late in the summer. At present there is too much water, but it is used to good advantage in ground sluicing.

The hydraulic mines in all sections of the county are now being worked full-handed, with plenty of water to keep all the giants supplied, besides running the hydraulic elevators and other apparatus requiring a great body of water.

All the high and dry gulch diggings near the summits of the high hills are beginning to be well supplied with water since warm weather set in this week, and there is a great amount of snow high up to keep the supply plentiful for quite a long time, much longer than usual.

The cold weather of the past few weeks, though not severe, was sufficient to stop the flow of water in all the placer mining claims, yet had the effect of hardening the snow to make it melt more gradually for general benefit when the weather moderated to warm, spring-

like temperature. This is better for miuera than warm rains and warm days to dissolve the snows of the mountains and gulches with a rush, only to be wasted in causing heavy freshets so common in California.

NEVADA.

Washoe District.

OFFICIAL COMSTOCK NEWS.—The following official statements have been received from Comstock mines and filed at the local offices:

Con. California and Virginia—1650 level.—From the drift run north from the foot of this apraise on the sill floor of this level, at a point 190 feet in from its mouth, a west crosscut has been advanced 19 feet, passing in porphyry and quartz of low assay value. The crosscut running east from the drift run north from the east crosscut No. 1 from the north drift from the winze (down 52 feet) has been extended 23 feet; total length, 68 feet; face in porphyry and quartz of a low assay value. In working upward, near the mouth of the east crosscut, we have extracted some ore. The ore from this point with that extracted in our workings in the vicinity of the winze—down 20 feet—amounted to 25 tons, assaying \$50.35 per ton. Have shipped to the Morgan mill 166 tons and 1270 pounds of ore, the assay value of which, per car samples, was \$31.56 per ton. The assay value, per battery samples, of the ore worked at the mill during the week (30 tons) was \$28.55 per ton. The crosscut No. 1 started from the southwest drift (the Rule drift) from the 1000-foot station of the Consolidated Virginia shaft, at a point 343 feet south of the shaft station, has been extended 42 feet, passing through porphyry, clay and quartz; total length, 50 feet; face in porphyry formation. At a point ten feet south from the east crosscut, on the east side of the drift, we have cut out an opening from which we are preparing to carry up our apraise. This opening is the size of two square sets of timbers, or 12 feet along the drift and 6 feet to the east. In the northerly part of the opening some streaks and bunches of ore were exposed which extended eastward and upward. Samples taken from the top of the south half of the opening gave an assay value of \$34 to the ton, and samples from the sill floor of \$14 per ton. The ore which has been saved from this opening shows an average value of \$20.50 per ton. At a point in this southwest drift, 527 feet from the shaft station, or 117 feet north from the Best & Belcher connection, an east crosscut (No. 2) has been started.

In the Ophir mine, on the 1465 level, the north drift from the west drift is in 176 feet and is cutting porphyry, clay and quartz of low assay. An advance of 114 feet has been made during the week in reopening and repairing the Central tunnel, making the total length of the drift reopened from its mouth 800 feet. Have continued (jointly with the Mexican Company) the work of making repairs to the main shaft. In the Mexican mine, on the 1465 level, the west crosscut from the south drift from the apraise 40 feet above the sill floor is in 261 feet, and the face is in porphyry and quartz of low assay. Near the mouth of this crosscut an apraise has been carried up 16 feet in porphyry and quartz of low assay value. In the Andes mine, on the 420 level, west crosscut No. 3 was extended 16 feet; total length, 54 feet. Formation quartz, with some porphyry. In the Best & Belcher mine, on the 900 level, the east crosscut on the north boundary has been extended 16 feet; total length, 174 feet; face in porphyry. They are also doing some repairing on the 400 and 900 levels.

In the Gould & Curry mine, on the 200 level, west crosscut No. 5 in the northwest drift, 432 feet from the main west drift, has been extended 12 feet; total length, 919 feet; face in hard porphyry. In the Hale & Norcross mine, on the 1300 level, they have been timbering the greater portion of the week. Extracted from winze below this level six cars of ore assaying \$17.99 per ton. In the Kentuck Con. mine, on the 1100 level, the south drift from the top of the apraise above the north crosscut is in 37 feet; face in fair-grade ore. They have started a raise at this point to connect with the 1035 level for better ventilation. The west crosscut from the south drift near the south line is in 49 feet and continues in low-grade ore. They will start work on the 1200 level on the 5th inst. In the Alta mine they advanced the apraise 16 feet; total height, 73 feet; face in quartz and porphyry carrying low assays. They have extracted about eight tons of ore from south etope, the average value of which according to car samples is \$42 per ton.

THE RULE DRIFT.—*Virginia Chronicle*, March 6: There are three months yet ere the Rule contract with the Con. Virginia Company will expire, and several hundred feet of ground to explore; yet, from the hear feeling evinced at present, it would seem bonanzas are expected to pop out without being sought, and if they do not there is something wrong. There are four men working on a shift in the Rule drift at present—two in the apraise 343 south of the shaft, and two in the east crosscut 527 feet south of the same point—and the advancement of operations is consequently slow. Mr. Rule, who favors more rapid work, hopes that the Con. Virginia Company will increase the laboring force after awhile and prosecute explorations more vigorously. The main drift is through heavy ground, and requires attention also to keep it open. The crosscut above named is at present about 20 feet out. It will probably be 100 feet or more in length when it reaches the east wall of the ledge. It is running in favorable ground, and has many chances of developing an ore body. The apraise still has ore streaks in the top which may run into a big deposit at any moment. There is plenty of room for an ore body between the shaft and the Best & Belcher winze, which are 644 feet apart, and Mr. Rule is just as certain as ever of finding ore. Thus far the workings in the ledge are all on the east side of the Rule

drift. The west side offers a field of some proportions also, which will probably be tackled in due time. The prospecting operations will necessarily seem slower than the driving of the main drift, owing to the division of laborers among the different workings.

Silver Star District.

A GOON GOLD CAMP.—*Douglass cor.* Hawthorne *Bulletin*: There are two camps here. One is on the west slope of Robb's Ridge, facing the Garfield mill, and the other is on the east slope.

On the west side are located the Dunlap & Truman mine, running easterly and westerly. They are running a tunnel on the ledge and are in 50 feet, showing a ledge from two to six feet wide. They had no prospect of gold when they started the tunnel, but now the workings show from \$5 to \$25 per ton. Mr. Dunlap informs me that he can transport his ore to the Garfield mill for \$1 per ton.

The next claim, adjoining this on the north and running parallel to it, is the Deluvia, owned by Frank Pedrazzi. There is a tunnel run on the coners of the ledge 25 feet; average size of ledge, two feet. There is on the dump sacked for shipment to Hawthorne seven tons of ore that is estimated \$30 per ton. This ore will be shipped to get a mill test of the ore.

Next on the north is the Judy, owned by Flemming & Grassie. A tunnel in ten feet exposed the ledge and they are now sinking an incline on it. There is a 20-inch vein of fine quartz. On the dump is seven to ten tons, which assays \$40.

The two extensions of this mine on the north west are owned by Bowen & Fanr. They are the Pinte and Toyabe. There has been but little work done on these two claims, but the ledge crops out and shows a two-foot ledge. Mr. Bowen informs me that the croppings will horn from \$5 to \$25.

The Fottler mine is owned by Douglass & Co., and is located next to the Deluvia. This mine has a cut run in showing a three-foot ledge that the owners say will horn \$20. The ledge crops out full length of claim.

Next east is the Duke, owned by Douglass & Co. Incline 20 feet follows 18 inches of \$5 to \$20 ore.

Next is the Excitement, owned by Douglass & Co. No work has been done, but a strong ledge runs clear through it.

Adjoining this is the New Party, owned by Douglass & Co. Incline 12 feet, showing 18 inches \$20 ore.

Next east is the Hard Scrabble, or Brown mine, owned by Ed Brown. This is the chief of the camp at present and is a wonderful deposit of ore. It is sunk on to a depth of about 30 feet, showing a ledge of five feet of ore. There is on the dump some 40 tons of ore. About 200 sacks of this ore was sampled and assayed by W. J. Douglass, assayer for the Mt. Diablo Co., and went \$204 per ton. The second-class ore is estimated at \$30 per ton.

East of this A. W. Curtiss and Robert Webster have claims which prospect well.

Another good property is the Orphan Boy, running parallel to the Duke. The ledge has been opened 30 feet deep by tunnel, showing three feet of decomposed ore, average dump samples of which go \$42.

These are only a few of the claims located.

The weather has been rough for the past ten days. A good deal of snow has fallen, preventing prospecting to a great extent, but now the snow is going off and if it continues fair prospectors will soon be able to go into the hills.

Devil's Gate District.

GOON ORE.—*Territorial Enterprise*: During February the Oest mine, in Silver City, produced 100 tons of ore, the average value of which did not fall far below \$75 a ton in gold. F. Bierke, owner of one-half of the property, showed a sample of the ore taken from a streak or pocket in the mine which was an almost solid mass of wire gold. Pockets of this character have frequently been developed in the mine in the past twelve months, a few sacks of ore from which swelled the monthly output from the property up in the thousands.

The Zedig tunnel is showing ore of fair quality at several points, which will be extracted when the tunnel connects with the workings of the Northern Belle and other locations in Devil's Gate District. The tunnel is being run for the purpose of draining the mines of that district at a depth of 200 feet below the present workings. The Oest mine shows a fine ore vein on the water level, and when the tunnel is completed it can be followed downward without incurring the expense of placing a costly pumping plant on that property. The Zedig tunnel will prove as valuable an outlet for water to the mines of that district as the Sutor tunnel is to the Comstock lode.

Colonel Quinn is extracting ore from the Hayward and the returns are very satisfactory, leaving a good margin above operating expenses. W. Naleigh and "Pap" Smith are saying nothing but are evidently sawing wood and the returns from their mining property in that district are encouraging. Numerous other mining locations there are steady producers of the yellow metal.

Kennedy District.

TESTING ORES.—*Silver State*: John Ross has been assaying and testing the ores of the camp for the last ten days. He finds everything satisfactory, and under his supervision the mill is being remodeled and will be ready to start up in a week or ten days, when it is hoped that it will be successful.

ARIZONA.

GOON GOLD MINE.—*Prescott Journal-Miner*: George Wickler and J. W. Barrington are developing their Silver Flake mine on Groom creek. The name of this property is a misnomer, as it is a gold-producing mine. The

ledge is good and strong and yields ore which goes \$30 per ton in gold.

Dan Hatz is making a success of his arrastra. He brought in several hundred dollars recently as the result of a partial clean-up. This property is well developed, and to a company or individual who would take hold of it, erect a 20-stamp mill and work the ore from it, the property could be made to pay handsome dividends.

Another good property in the Hassayampa district is the Dan O'Boyle group of mines. This property consists of ten claims, several of them being fairly well developed, sufficient to keep a 20-stamp mill at work reducing ore. This is a property, too, which offers tempting inducements for investment. A 20-stamp mill on this group could be made to pay for itself and the entire purchase price of the property within a few months.

Big Bug and Chaparral continue to keep up their reputations as producers of gold bullion and are enriching the owners of all mines that are being worked.

Daniel E. Keating, the well-known mining man, who formerly operated in Humburg district, has returned to Arizona as agent of the Storm Cloud Mining Company, and it is understood that operations will be commenced again soon on this property.

NO SHUT-DOWN.—*Tombstone Prospector*, Mar. 4: A rumor that the T. M. & M. Co. would dispend with all of the men working there has been indistinctly circulated for a week past. To-day was to have seen the formal shut-down, but it did not take place. But six men were let out at the North-west mine. At all the other mines the full complement of men is at work taking out good ore which is being shipped to the smelters. Although silver is low, this company is paying all expenses and a little better.

THE PHOENIX TROUBLES.—The *Tampe News* announces the resignation of Supt. Alex. Trippel, of the Phoenix mine, for the very good reason that the ore, in quantity, averages only \$2 per ton in gold. Dr. Trippel was called to the management after the plans of development and improvement had all been arranged and partially executed, and the costly mill of 100 stamps was in course of erection. This heavy expenditure was ill-advised and the site for the mill badly chosen, entailing an expense, as we are informed of one-third more in delivering the ore to the mill than would have been necessary had the mill been more favorably located. Dr. Trippel is in no way responsible for the present difficulties. We are also told that the company is in litigation with Fraser & Chalmers, of Chicago, over the payments on the mill, and it looks very much as though another disastrous failure is about to be recorded in the attempt to make the Phoenix a paying enterprise.

Two wealthy companies had "gone broke" on the property previous to its purchase by the present owners, and it had become notorious in mining circles, and columns in the mining papers were given to contentions as to its value and the practicability of transforming it into a paying property.

NEW GOLD CAMP.—*Mohave Miner*: Col. Harley Fay, who has just returned from the new gold camp on Burro creek, gave a *Miner* reporter the following facts about that section:

The claim owned by McGee, Eshom and Josephi has a shaft down 40 feet in good ore. There is about 20 tons of ore on the dump that will run about \$100 per ton. The ledge is about 12 inches in width and is the best showing in mine. Jeff Bland has a good showing in his mine a short distance from the above-mentioned claim. The ore shows the full length of the claim and partly across the claim adjoining, owned by Charley Wilson. Frank Cofer has a claim named the Red Bird that shows well on the surface and has some other valuable showings. W. A. Neal, Al Boner and many other prominent Sandy ranchers have claims in the new camp. Parties who contemplate going to the new camp should lay in a supply of grub, as there is no store there yet and the nearest supply point is Signal, 25 miles distant. The camp is well situated for economical work, being only two miles from Burro creek, where an abundance of water can be obtained for milling purposes. Enough wood can be obtained in the vicinity to run a small mill for two years.

BEGIN WORK.—*Mohave County Miner*: Halley & Lynch have commenced work on their sampling works. The frame work is already up and everything will be ready for the machinery next week.

It is rumored that W. H. Lake, through Ewing & Helmrod, will soon start a branch sampling works at White Hills for the purpose of handling the ores of that camp. Competition makes business lively. This will be a great accommodation to the miners of White Hills who have small lots of ore to sell.

BRITISH COLUMBIA.

BIO VEIN OF COAL.—A Victoria dispatch says: A valuable seam of coal has been discovered three miles back of Sumas lake, and a syndicate of Scottish capitalists has been given an option on surrounding property. It is well known that some time ago coal indications were found in the vicinity, and a number of Vancouver men, ex-Mayor Oppenheimer and J. Bellamy among them, sent an expert to inspect the ground.

The vein was traced down the side of the mountain, and on the expert's advice some sinking was done which is said to have resulted in disclosing a fine vein 37 feet thick. Negotiations were begun in November with the Scotch syndicate, who was to send experts, and if the find proved as valuable as supposed, they expressed a willingness to spend \$1,000,000 developing the property.

What is considered the most valuable part of the find is in the Indian reserve, close to the mountain. A diamond drill is to be used in

thoroughly prospecting the ground immediately.

IDAHO.

SNAKE RIVER PLACES.—*Boise Democrat*: Rev. McReynolds and Messrs. Cook, J. B. Foster and Schneider took a flying trip lately to the Martin-Schneider claims on Snake river. The claims are about ten miles above Walters' ferry. They have a high bar of about 120 acres, on which a number of men are rocking and taking out about \$2.50 a day to the man. They wheel the gravel about 60 yards, to get it to the water. Messrs. Martin and Schneider are figuring on a pump to raise the water 40 feet from the surface of Snake river to the top of the bar, and if successful they will have a good thing. The gold on these claims is not the ordinary float or scale gold of Snake river. It is fine, but is rough floor gold, and when seen through a glass has a rough jagged appearance, showing that it has not traveled far. It is very easily saved in a rocker or sluice boxes. Immediately at this point on the river is a large cliff of cement some three feet thick and extending four miles up the river, all of which contains some gold, and there is no doubt that the gold on this bar comes out of this body of cement, and should the cement prove to be rich enough to pay for working, the day of gold mining on Snake river is just beginning to dawn.

MONTANA.

WORK AT BUTTE.—*Inter-Mountain*, Feb. 24: The Montana Ore-Purchasing Company is now employing about 350 men. In addition to the supply of ore treated at this company's smelter from the Ramus and Gulgarry mines, a large quantity of ore from other properties, notably the Eveline, is also being worked there. The Eveline is shipping very rich ore.

The Clark syndicate deal seems to be in statu quo. During this week an effort was made to secure a hold on the McQueen addition, across Silver Bow creek from the Heuze smelter, but the owners would not give it. They want to sell outright. It was presumed this ground was wanted for the purpose of building a smelter by the proposed Clark syndicate, but this was only conjecture. The site was considered a good one, water being available. Connection by rail could also be made with the Montana Union to tap the mine of the proposed company.

Miles Finley and T. R. Hinds, according to authentic reports, have struck a fortune in the Buffalo. This is an Anasocua property, west of the Mountain Con. holet, and the lessees have a three-year lease. It is claimed that they have opened up a body of ore that contains 60 per cent copper and is three sets wide. It is also said they have \$25,000 worth of ore on the dump. Arrangements are now being made to build a spur of the B. A. P. road to tap the Buffalo.

Butte is now giving evidence of becoming an important lead-producer. Heretofore lead ore has been passed by as worthless, but recent developments show that there is plenty of lead here in paying quantities. The Humboldt, Gray Rock, Josephine, Banker and Magna Charter mines are now making regular shipments of lead ore, the Humboldt, located in Centerville, being the principal producer. The lead ore runs in chutes of large proportions. Some are carrying 50 per cent lead has been taken out. Lead ore finds a ready market.

OREGON.

THE SANTIAM GOLD DEAL.—The *Salem Statesman* has the following: A mining deal was consummated in Albany Saturday which means a great deal for this part of Oregon. Under it the Albany Mining and Milling Company banded all their property in the Santiam mines to Thomas G. Drew and C. C. Clark, two wealthy mine owners recently in the mines, for \$40,000. Mr. Drew, one of the present owners, is the principal owner in the famous Hammerley mine at Jumpoff Joe, and is a practical mining man. When questioned as to his new property, he said: "Mr. Clark and I went in to look over the property about three weeks ago, and were so well satisfied with what we saw that we closed the deal immediately upon our return on Saturday. The mineral belt in which the property is situated is the finest I have seen, and I may say that my travels have not been confined to Oregon alone. The ore is low grade, assaying from \$8 to \$28 per ton, but there is plenty of it and it can be easily taken out. Over 3500 feet of tunneling, in the shape of development work, has been done, and the body of ore exposed to view is sufficient to keep a 10-stamp mill in constant operation for ten years. The vein is from four to eight feet wide and contains pay rock from wall to wall.

Complimentary Samples.

Persons receiving this paper marked, are requested to examine its contents, terms of subscription, and give it their own patronage, and, as far as practicable, aid in circulating the journal and making its value more widely known to others, and extending its influence in the cause it faithfully serves. Subscription rate, \$3 a year. Extra copies mailed for 10 cents, if ordered soon enough. If already a subscriber please show the paper to others.

A New System of Pumping.

Wm. Nance, of Grass Valley, Cal., is the patentee of a new system of pumping, by which it is claimed the weight of the required machinery is reduced one-half, and the necessity of heavy balance rods in the shaft is dispensed with. In many essential points it is asserted that superiority is manifest, notably in the automatic tightening and lubricating of the stuffing-box gland when working under water.

Newly Established.

E. A. Rix, formerly of Rix & Birrell, is newly established, and is in business for himself at 104 First street, San Francisco. He is agent for standard makes of mining machinery and supplies, engines, boilers, etc.

MINING SHAREHOLDERS' DIRECTORY.

Compiled every Thursday from advertisements in the Mining and Scientific Press and other S. F. Journals

COMPANY AND LOCATION.		ASSESSMENTS.		SECRETARY.	
		NO.	AMT.	LEVIED.	DELINQ. AND SALE.
Alpha Cons M & Co, Nev.	13.	10c.	Jan 18, Feb 21, Mar 22.	Chas F. Elliot, Nevada Block	
Alta S M Co, Nevada	45.	10c.	Jan 25, Feb 28, March 21.	J E Jacobs, Nevada Block	
Andes S M Co, Nevada	49.	25c.	Mar 6, April 10, April 23.	John W Telous, Nevada Block	
Bullion M Co, Nev.	42.	15c.	Jan 23, Feb 28, Mar 20.	R R Grayson, 331 Pine	
Con Cal & Va M Co, Nevada	4.	5c.	Mar 6, April 10, April 23.	A W Haven, Nevada Block	
East & West S M Co, Nev.	40c.	10c.	Jan 25, Feb 28, March 21.	O H Mason, 324 Montgomery	
East Sierra Nevada M Co, Nevada	3.	5c.	Jan 10, March 24, April 13.	Geo R Spinnery, 314 Pine	
Eclipse M Co, California	7.	2c.	Feb 8, Mar 12, Apr 3.	Otto Lund, 216 Buau	
El Leopoldo G & S M Co, Mex.	5.	1c.	Jan 25, Mar 1, Mar 19.	Jabez Howe, 214 Pine	
Keweenaw Star M Co, Cal.	12.	10c.	Jan 11, Feb 23, Mar 15.	J J Scoville, 20 Sansome	
Knights S M Co, Nev.	73.	15c.	Jan 31, Mar 8, Mar 23.	A K Burrows, Nevada Block	
Iowa M Co, Nev.	19.	5c.	Jan 24, Feb 28, Mar 19.	R L Thomas, 419 California	
Justice M Co, Nevada	18.	10c.	Feb 6, Mar 12, April 2.	K E Kelly, Nevada Block	
Martin White M Co, Nev.	22.	25c.	Jan 13, Feb 24, Mar 31.	K L Ross, Sup Court Bldg	
Occidental Cons M Co, Nev.	15.	10c.	Jan 19, Feb 19, Mar 14.	A K Burrows, Nevada Block	
Overman S M Co, Nevada	70.	10c.	Mar 6, April 10, April 30.	Geo D Edwards, 414 California	
Osborn Hill M Co, Cal.	1.	25c.	Jan 17, Feb 23, Mar 12.	R R Grayson, 331 Pine	
Peer M Co, Ariz.	16.	5c.	Jan 26, Mar 6, Mar 26.	Aug Waterman, Nevada Block	
Peoria M Co, Ariz.	31.	5c.	Jan 26, Mar 6, Mar 26.	Aug Waterman, Nevada Block	
Placerville S M Co, California	3.	5c.	Mar 6, Feb 15, Mar 13.	Chas A Hare, Pier 5, Steuart St	
Plutoid M Co, Nevada	41.	25c.	Mar 6, April 16, May 2.	Chas E Elliot, Nevada Block	
Plutoid M Co, Nevada	83.	25c.	Mar 6, April 16, May 2.	Chas E Elliot, Nevada Block	
Scorpion M Co, Nevada	5.	5c.	Jan 10, Mar 16, April 6.	Geo R Spinnery, 314 Pine	
Stanton M Co, Nevada	6.	25c.	Jan 28, Mar 7, Mar 27.	Chas C Bridge, 224 California	
West Helcher & Miles Cons M Co, Nevada	13.	10c.	Feb 5, March 9, March 29.	E B Holmes, Nevada Block	
Sierra Nev S M Co, Nev.	106.	25c.	Jan 17, Feb 20, Mar 12.	E L Parker, Nevada Block	
Sierrita Cons Quicksilver Co, California	8.	7c.	Mar 2, April 6, April 27.	Edw F Stone, 306 Pine	
Sierrita Mining Co, Mexico	13.	5c.	Feb 16, Mar 23, Apr 10.	K J Willats, Flood Bldg	

COMPANY AND LOCATION.		MEETINGS.		SECRETARY AND OFFICE IN S. F.		DATE.	
Chollar M Co.	Annual.	Chas E Elliot, Nevada Block.				Mar 21	
Debi M Co.	Annual.	O F Hunt, 14 Sansome.				Mar 14	
Keweenaw Star M Co.	Annual.	J J Scoville, 20 Sansome.				Mar 21	
Placerville S M Co, Nevada.	Annual.	A H Thompson, Nevada Block.				Mar 14	
Plutoid M Co, Nevada.	Annual.	Chas E Elliot, Nevada Block.				Mar 14	
Plutoid M Co, Nevada.	Annual.	Chas A Hare, 909 R R Ave.				Mar 10	

Market Reports.

The Markets.

SAN FRANCISCO, March 8, 1894.

The past week has presented no encouraging features in the silver market. Stocks continue large, and it is reported in London that £1,000,000 in bullion is about to be placed on the market. The quotations to-day were 27 1/2 d in London, 59 1/2 c in New York. There has been no change during the week in copper and lead.

New York Prices.

NEW YORK, March 8.—Following are the closing prices for the week:

Silver in		Copper.		Lead.		Tin.	
London.	N. Y.	9 62 1/2	3 10	18 75			
Thursday.	27 1/2	60	9 62 1/2	3 10	18 75		
Friday.	27 1/2	59	9 62 1/2	3 10	18 28		
Saturday.	27	58 1/2	9 62 1/2	3 10	18 25		
Monday.	27	58 1/2	9 62 1/2	3 10	18 40		
Tuesday.	27 1/2	59 1/2	9 62 1/2	3 10	18 25		
Wednesday.	27 1/2	60 1/2	9 62 1/2	3 10	18 25		

SAN FRANCISCO Metal and Coal Market.

ANTIMONY.		QUICKSILVER.	
Refined, near lots.	@ 7 1/2	Home trade, 30 @—	
Powdered, do.	@ 7 1/2	do., 30 @—	
Concentrated, do.	@ 7 1/2	STEEL.	
All grades jobbing at advance.		English, D.	@ 20
		Oanton tool.	@ 14
		8 1/2" Diam tool	@ 15
		Pick & Hammer.	@ 10
		Machinery.	@ 4 1/2
		Tool Oalk.	@ 4 1/2
		Spot @ 10.	@ 21 @ 22
		IRON.	
Bar, base.	@ 2 1/2	Spot FROM YARD.	PER TON.
Norway, base.	@ 4 1/2	Wellington.	@ 38 00
PIO IRON.		Nanaimo.	@ 7 50
Epitikon @ ton.	22 50 @	Ollman.	@ 5 00
Oleagorock.	22 50 @	Seattle.	@ 5 50
Am. Soft, No. 1.	@ 20 00	Coos Bay.	@ 5 50
Shots No. 1.	22 50 @	Channel.	@ 9 00
Shot No. 2.	22 50 @	Egg, hard.	@ 12 00
Shot No. 3.	22 50 @	Walrus.	@ 7 25
Langdon.	22 50 @	Scotch Split.	@ 8 00
Oscherelle.	22 50 @	Brybo.	@ 7 50
Barrow.	22 50 @	West Hartley.	@ 7 50
Oscherelle.	22 50 @	TO LOAD—PER TON.	
		Australian.	@ 5 50 @
		Liverpool Steam.	@ 6 87 @
		Scotch Split.	@ 7 00 @
		Barrow.	@ 7 00 @
		Lehigh Lump.	@ 10 00 @
		Umburland.	@ 8 50 @
		Egg, hard.	@ 9 00 @
		West Hartley.	@ 7 50 @
		Drop, sizes smaller than	
		B. bag of 25 lbs.	@ 17 50
		Do, B. and larger sizes.	@ 17 50
		Bag of 25 lbs.	@ 20 00
		Back, Balls and Chilled	@ 21 00
		Do, bag of 25 lbs.	@ 21 00
		Umburland.	@ 9 50 @

Mining Share Market.

SAN FRANCISCO, March 8, 1894.

Mining Cash Balances.

Following is a statement of the cash balances of certain mining companies on the first Monday of March, as required by law:

Alpha	\$10,783	Justice	\$8
Alta	7,879	Kentuck	4,200
Belcher	1,028	Lady Washington	464
Best & Belcher	11,578	Mono	3,853
Bullion	13,137	Mexican	19,041
Bodie	4,986	Nevada	1,684
Caledonia	7,945	Nevada Queen	1,771
Challenge	853	Ophir	15,962
Chollar	7,177	Overman	4,471
Con. Imperial	571	Potosi	1,418
Confidence	6,200	Savage	5,254
Con. New York	8,118	Scorpion	2,147
Con. Cal.	1,401	Seg. Belcher	289
Crown Point	10,958	Sitter Hill	515
Exchequer	2,858	Sierra Nevada	23,776
Gould & Curry	791	Standard Con.	83,664
Hale & Norcross	18,070	Union Con.	10,775
Julia	1,683	Utah	2,005

The indebtedness of other companies on the 5th is reported as follows:

Andes	\$107	Grand Prize	\$238
Buller	2,867	Occidental	\$9,000
Commonwealth	21,739		

As an offset Occidental Consolidated has \$1534 in the treasury. Justice is collecting an assessment. California is near the assessment line.

The levying of several assessments caused a weaker range of prices in the Comstock market during the week. These assessments, and others which are to come, have been in a measure discounted among stock dealers. During the past two days, however, there has been some improvement, Ophir and Mexican and the shares of the other mines at the north end of the Comstock continued to be strong features in the market to-day. Most of them

opened at an advance on yesterday's closing prices and were well sustained up to noon. Con. California and Virginia and the other stocks showed no particular change during the forenoon, yet their prices did not go down. Judging from the very large number of people, including some who were lately high bulls on the stock, who by their talk show that they would like to have Con. California and Virginia decline to \$3 and under, quite a high short interest in it has accumulated.

A drop in Con. Cal. & Va. Monday was attributed to disappointment among certain holders because Superintendent Lyman's official report of last week's work in the mine did not confirm the stories about six feet of \$50 ore having been struck in the upraise from the Rule drift on the 1000-foot level.

Board Sales of Mining Stocks.

S. F. Stock Board.

THURSDAY, March 8, 1894.

200 Andes.	30c	100	1.45
300 Bodie.	75c	50 Ophir.	2.50
100 Best & Belcher.	25c	100 Potosi.	.90c
100 Bodie.	1.80	100 Savage.	.50c
100 Bodie.	1.50	500 Sierra Nevada.	1.30
450 Con. Cal.	3.25	50 Seg. Belcher.	1.5c
100 Crown Point.	.60c	250 Union.	.90c
550 Mexican.	1.50	500 Yellow Jacket.	.70c

100 Alta.	15c	100 H & N.	.60c
300 Andes.	35c	100 Justice.	.5c
50	30c	200 Mexican.	1.50
100 Belcher.	70c	150 Ophir.	2.50
600 Bodie.	2.50	100 German.	1.5c
200 Challenge.	.5c	100 Potosi.	.90c
100 Chollar.	.50c	100 Savage.	.50c
600 C. & V.	3.25	150 Sierra Nev.	1.35
100 Crown Point.	.60c	15	1.25
100 Exchequer.	.5c	200 Yellow Jacket.	.70c

Coast Industrial Notes.

—Santa Clara will vote on the 13th of March on a proposition to refund the city's indebtedness.

—The Santa Clara Bank has entered suit against its debtors. Money is needed to square accounts with creditors.

—San Diego will soon be joined to La Mesa by a motor line. Work will be commenced at once, and in 30 days it is thought the line will be in operation.

—The bank at Horre, Mont., has closed its doors because of its inability to negotiate its papers. Its assets are \$14,000 while the liabilities are placed at \$9000.

—The Odd Fellows' Lodge of Ontario, Cal., has let contracts for a building and hall. The building complete, with hall furnishings, will cost about \$5000.

—To facilitate work on the ditch of the Consolidated Canal Company at Mesa, A. T., a steam shovel has been secured. An electric-light plant has been obtained, and work will be carried on night and day.

—Judge Fullerton has ordered the sale of the Oregon Pacific Railroad at a date no later than June 1st, the date to be fixed by the sheriff. Bidders will be required to make a deposit of \$200,000.

—The Peoria canal at Gila Bend, A. T., is 40 miles long and covers 50,000 acres. The dam is being completed as rapidly as possible, 160 men being employed in its construction. When finished it will be 1920 feet long, 17 feet high and 32 feet wide.

—It is definitely stated that work will be resumed on Humboldt bar April 1st. This means the resumption of work at the quarries, in the woods and at the mills. The resumption of work will give employment to a large force of men.

—An Ottawa dispatch to the Victoria Colonist says that the Government has entered into a ten-years contract with James Huddar, subject to the sanction of Parliament, for a line of Canadian Atlantic steamers, capable of steaming 20 knots an hour, to connect with Australian steamers by the Canadian Pacific railway. Quebec and

AGENT FOR

Phoenix Rock Drill,
Van Auker Steam
Specialty Co.,
Mabb's Hydraulic
Packing,
Sensitive Governors,
Locke Damper Regu-
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Knight's Universal
Steam Joint,
Prentice Lathes and
Drill Presses,
Union Mfg. Co. Pumps,
Slide Valve Engines,
Corliss Engines,
Boilers, Etc., Etc.



Double-Acting Cornish Plunger.

PUMPS TWICE AS MUCH WATER AS THE OLD PLUNGER.

AN ENTIRE NEW SYSTEM OF PUMPING.

Weight of Machinery Reduced One-Half, besides doing away with heavy balance bobs in the shaft. Works with 10 per cent less power. First outlay one-third less. Suitable to any underly or downright shaft. Occupies less space in the shaft. Has been tested a year and proved to work satisfactory in every respect. GLAND OF STUFFING-BOX TIGHTENED AND LUBRICATED AUTOMATICALLY WHEN WORKING UNDER WATER. Works very much longer than any other pump under water.

IMPROVED SINKING OR BUCKET PUMP.

The valve-clack and bucket can be changed when the pump is under water. Bucket lasts six times as long as a leather geared bucket, often saving expense of putting down another pump, especially in jack-head pumps, where the bucket and clack cannot be changed under water. Special attention is called to this new system of pumping, and also to the self-screwing stuffing-box and new bucket gearing, which are applicable to all kinds of plunger, force, and bucket pumps.

WM. NANCE, Grass Valley, Nevada County, Cal.

Hallfax are to be the Atlantic terminals. It is expected that the Imperial Government will handsomely subsidize the service.

—A Chicago company is figuring on buying Santa Rosa's water works, but insists that a quarter of the stock should be taken in Santa Rosa. This is to quiet the feeling of opposition that has developed among the people. It is proposed, if a proper understanding can be reached, to put \$500,000 into the enterprise.

—Otto von Geldern, the well-known civil engineer, has been retained by the directors of Modesto Irrigation District to make surveys and estimates for the completion of the flumes and canal of the Modesto district. There remain about 4000 feet of flume to be constructed and a small portion of the work in the canal to survey.

List of D. S. Patents for Pacific Coast Inventors.

Reported by Dewey & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR WEEK ENDING FEB. 27, 1894.

515,323.—MUSICAL INSTRUMENT—H. G. Carswell, Santa Clara, Cal.
515,544.—CUPPER HOOD—T. A. Fairbairn, San Diego, Cal.
515,545.—VISE—J. W. Flowers, Portland, Or.
515,522.—KURLE—C. J. Kurle, Calistoga, Cal.
515,548.—SAOBEREISH CUTTER—Froman & Murray, Vele, Or.
515,660.—GAS BURNER—H. A. Fry, S. F.
515,871.—MUSICAL INSTRUMENT—J. S. Goldman, Los Angeles, Cal.
515,524.—ENVELOPES—Max Grube, S. F.
515,470.—DRAWING BOARD—C. Harb, S. F.
515,475.—PUMP—C. A. Kelly, Oakland, Cal.
515,343.—FRUIT DRIER—C. J. Kurle, Salem, Or.
515,601.—CAR VESTIBULE—L. S. Manning, Alessandro, Cal.
515,802.—CAR DOOR—L. S. Manning, Alessandro, Cal.
515,548.—BOAT—A. Martz, S. F.
515,550.—GATOR FOR RULES—J. J. McManus, S. F.
515,530.—GAS ENGINE—E. Narjot, S. F.
515,353.—SEPARATOR—J. Overholser, Colgate Grove, Or.
515,581.—INSECT TRAP—R. J. & R. S. A. Tarbell, Los Angeles, Cal.
515,330.—DRAWING STAMP—C. W. Tremain, Portland, Or.
515,541.—STRAP FORM—J. M. Walters, Los Angeles, Cal.
515,558.—SHAPING MACHINE—S. B. Whitehead, S. F.
515,555.—SALVE—Wilson & Worcs, Tucson, A. T.

NOTE.—Copies of U. S. and Foreign patents furnished by Dewey & Co. in the shortest time possible (by mail for telegraphic order). American and Foreign patents obtained, and general patent business for Pacific Coast inventors transacted with perfect security, at reasonable rates, and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

RULER.—Ferdinand Frank. No. 515,522. Dated Feb. 27, 1894. This invention relates to an improved construction for desk rulers, the object of which is to provide a combined and flexible ruler, the rigid portion of which is adapted to serve as a guide for drawing straight lines upon flat surfaces, while the flexible portion fits itself to the curved

pages of a ledger or other book, so that straight lines may be drawn with its edge as a guide, the rigid portion of the ruler serving to steady the curved part.

DEVICE FOR DRAWING STEAM BEER.—Constant Harth, S. F. No. 515,470. Dated Feb. 27, 1894. This invention consists of the interposition of a chamber or receiver between the cask and the drawing-off faucet, whereby beer can be drawn from fresh casks in a comparatively solid condition with but little or no escape of gas, and the gas which does pass into the chamber will immediately pass back into the cask as soon as the drawing-off cock is closed.

Cal. Debris Commission Notices.

THE CALIFORNIA DEBRIS COMMISSION having received applications to mine, by the hydraulic process from Thomas Alderson in the Spanish Hill Gravel Mine, near Placerville, El Dorado Co., to deposit tailings behind a dam on the bank of Cedar Creek; from the El Dorado Water & Deep Gravel Mining Co. in the Spanish Hill Hydraulic Mine, near Placerville, to deposit tailings behind brush dams in Spanish Ravine; from Pascoe & Gruben in the Eureka Hydraulic Mine, near Placerville, to deposit tailings behind a brush dam on Cedar Creek; from John Blair et al. in the Mitchell Hydraulic Mine, near Placerville, to deposit tailings behind brush dams in Spanish Ravine; from James Hackett in the Oriental & Tahoe Mine, near Rough & Ready, Nevada Co., to deposit tailings behind dams on the side hill and in a ravine; from E. B. Jacks in the Badger Hill Placer Mine, near Spanish Ranch, Plumas Co., to deposit tailings behind a rock dam in Spanish Creek; and from Tucker & Brown in the Grub Flat Placer Mine, near Spanish Ranch, to deposit tailings in an old hydraulic pit. Notice that a meeting will be held at Room No. 32 Flood Building, San Francisco, Cal., March 27th, 1894, at 1:30 P. M.

THE EVANS ASSAY OFFICE,

W. N. JERU, Proprietor.
Successor to JERU & OGDEN,
628 MONTGOMERY ST., San Francisco,
ROOMS 46 and 47 MONTGOMERY BLOCK.
Ore Assays, Analyses of Minerals, Metals and their Alloys, etc.
Lessons given in Assaying.

LOANS AND MINES.

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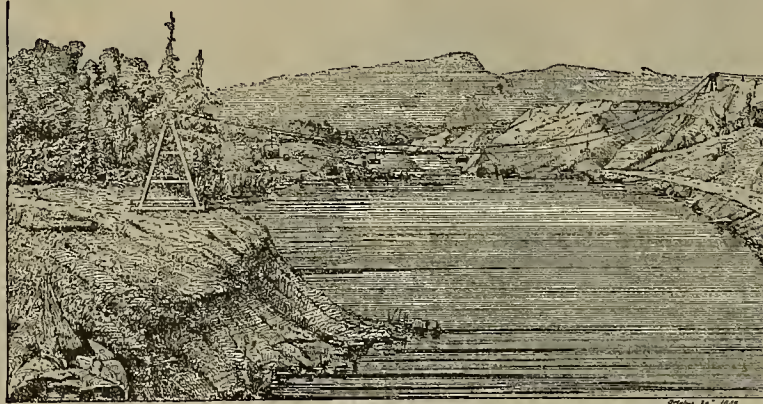
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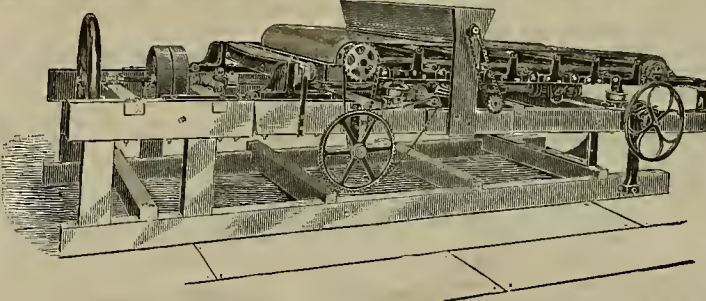
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Now, after a thorough trial of the McGlew Ore Concentrator, on ore difficult of concentration, I emphatically pronounce it the best concentrator of any I have ever used in handling my ore. It is doing CLEANER and CLOSER work than I had believed possible for any concentrator to accomplish.

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SAN FRANCISCO, SATURDAY, MARCH 17, 1894.

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SINGLE COPIES, 10 CENTS.

The Habit of Exaggeration.

It ought to be well understood by all who know anything of the history of mining that exaggeration in the long run does serious damage to the permanent interests of a mining district. It is also a well-known fact that many districts have been built up by assays and let down by working results. There always has been too much flamboyant nonsense about mining discoveries, though it is gratifying to realize that in a measure it is growing beautifully less each year, and truth now may, and again may not, be seen through a mass of figures and dollar marks. It may be added also that a great deal—the largest part—of this general distortion of facts is unconscious and put forth with no intent to deceive; but, for all that, it is exaggeration, and the tendency of the intelligent pub-

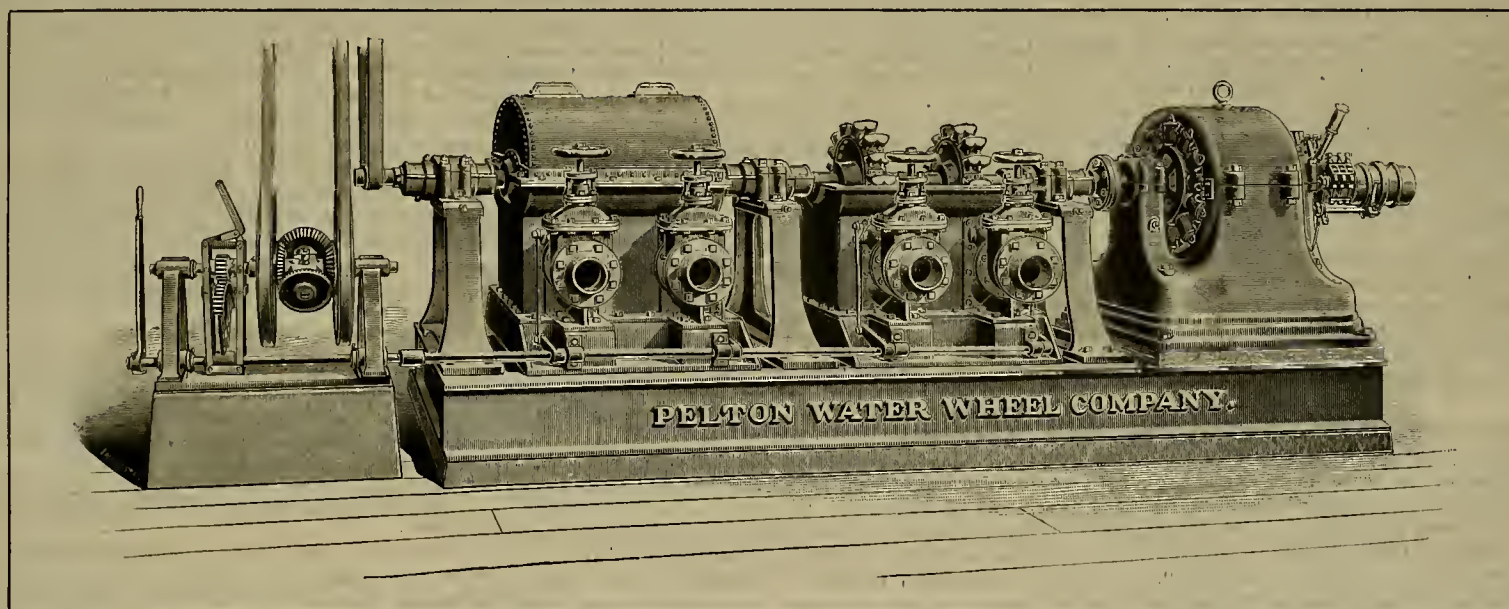
lic, at most, not too broad and conspicuous, and should not appear as the sole motive of the review. Capital is generally able to draw its own conclusions, when placed in possession of the facts. It has a habit of weighing statements as a judge weighs testimony, and estimating probabilities at their true value. Capital is cautious because it has a right to be cautious. Naturally it wants to eliminate, in any given venture, the chances of failure, just as far as they can be eliminated. The aim should be, therefore, first to give it information, and depend upon that and not upon any sentimental notion that a "property ought to be developed," in order to secure its co-operation.

The backbone of the mining industry to-day is the application of good business principles, sound economy and long experience to its conduct. Mining in its true sense implies science, industry and truth, exactly the same as

in part an effort to carry out the plan of the Miners' Association. It is gratifying to know that Congressman Newlands cordially responded to the wishes of the California organization. The bill meets his views and has his full endorsement.

Water Power and Electricity.

The cut on this page shows an application of Pelton wheels to electric generators by direct connection to the armature shaft. The wheels—four in number—are inclosed in two separate housings, all mounted on one shaft and connected to a 120 K. W. Westinghouse generator by an insulated coupling. They are 21 inches in diameter and have a combined capacity of 250-horse power, with a speed of 860 revolutions under a running head of 340 feet. The wheels in the plant here referred to require to be of



WATER POWER AND ELECTRIC GENERATORS.

lic is more and more to estimate accurately the value of things—to sift the real from the unreal. The design of the distributors of these large statements is always to attract the attention of the investing public to the merits of a particular district or a particular mine, and, incidentally, to avoid any possible chance of their light being hid under a bushel. But the public has become callous to that sort of thing, and it is more than ever difficult to secure attention by the statement of mere generalities.

In the nature of things it is hard to give complete and reliable data relative to any new mining proposition; indeed, it is practically impossible. But, so far as they go, the facts ought to be stated with care, the conditions and surface indications explained with an approach to accuracy and modesty, and the inferences drawn with prudence. Stereotyped expressions as to the "vast opportunities for investment of capital," "immense returns certain to accrue," "double your money in a year," "the opportunity of a lifetime," and all that kind of stuff, carry no weight. Many newspaper articles pretending to give an account of the undeveloped resources of the district in which they are printed use as their text the chances capital has long neglected by overlooking their merits. Such injudicious generalities too often precede and overshadow a narration of the facts, results, conditions, history and actual state of development. These should be the essence of such articles. The appeal to capital, if made, should be incidental,

any other legitimate pursuit. Adventitious circumstances sometimes permit the inexperienced miner to make a "strike" and a fortune; but the days of old, the days of gold, the days of '49, are fast becoming little more than a glorious memory, where luck ran rampant through California, and touched the tenderfoot and the old-timer alike with its golden rod. Conditions are different now, and it is necessary to place some of the pioneer methods in the background.

It may seem curious to many that the California Miners' Association has deemed it best to ask a Nevada Congressman (Mr. Newlands) to present to Congress the mining bill framed by its special committee appointed for that purpose. There were several good reasons for this action. It is desired above all things that the measure meet with the endorsement of the mining States generally, and to that end the interest and support of their various representatives must be solicited. The bill is not local in its provisions, and suggestions from various committees looking to its amendment have been expressly invited. It is to be hoped that the measure in its final shape will be recognized for all it designs to be—corrective of many inequities, ambiguities and even injustice of present law and present interpretation of law affecting every part of the great West. The selection of Congressman Newlands, whose devotion to mining interests is widely known, was

this small diameter to give proper speed to the generator under the head in this case available. A slower speed generator or a higher head of water would have admitted of larger wheels, and consequently a less number to give the same power.

The plant here shown is that of the Standard Con. Mining Co., of Bodie, California, and is one of the most interesting applications of electric transmission of power yet made in connection with mining operations. The power is transmitted 13 miles with a loss of only about 20 per cent, and affords a saving to the company of some \$25,000 a year in running expenses.

This installation illustrates the practicability of electric power transmission as well as the extraordinary saving which may be effected by utilizing a comparatively small water power though such a distance from the point where it is to be used. It also illustrates the extreme flexibility of the Pelton system and the facility with which adaptation can be made to all varying conditions.

The Pelton differential automatic governor shown on the left is designed to insure absolute and most sensitive control—maintaining a uniform speed on the wheels with instant and wide variations of load.

MARCUS DALY of the Anaconda has ordered reductions in wages ranging from 10 to 35 per cent on all classes of mining labor.

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San Francisco, March 17, 1894.

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THERE are now 54 producing mines at Johannesburg, is reported by the Witwatersrand Chamber of Mines in the December report. Of the number, 50 have stamp mills, the largest having 160 stamps and the smallest 10. The total number of stamps running is 2175. The average amount of ore crushed per stamp was 3.65 tons per 24 hours. The average yield per ton under stamps was \$7.92; total tonnage crushed, 210,168. Six of the mills make concentrates before stamping, and all of them concentrate tailings from the stamps. Three of the mills use chlorination to work their concentrates, though the same mills use the MacArthur-Forrest process on their tailings. The concentrates carry from \$19 to \$60 per ton. The tonnage worked by the MacArthur-Forrest process was 136,900, and the yield per ton was \$7.50. The value of the total yield for December was \$2,490,000.

A CORRESPONDENT having questioned a statement of the *Territorial Enterprise* that \$60,000,000 of tailings from the Comstock lies buried in the Carson river, that paper proceeds to back up its assertion with the assertion that the mills have saved only from 60 to 85 per cent of the assay value of the ore, and that the total output being \$550,000,000 the loss was at least \$60,000,000. The *Enterprise* rather overstates some of the facts, so far as they have been determined by good authorities. The accepted estimate of the total Comstock output is \$350,000,000. It is difficult to tell what the loss has been, but it is not generally believed that it is so great as \$60,000,000. However it is very great, and the Carson river bed is covered for many miles with a great mass of debris containing gold. The trouble has been to get it out. It is not hoped, even under the most successful efforts, that more than a fraction of the great value deposited there will be secured.

It seems to be difficult to arrive at the facts of the Cripple Creek strike. Last week it was announced that the miners had won, and that several mines had resumed. Now, however, we are told that there is no change in the status of affairs. To-day (Thursday) was set by the principal mine-owners for resuming on a nine-hour basis. A temporary injunction has been granted by Judge Downer of the District Court restraining the members of the various miners' unions from interfering to prevent men from working. The sheriff is at the camp, with instructions to enforce the order of the court at whatever cost. Some of the most radical members of the union say that they will fight the sheriff and all the National Guard if necessary to prevent men from working nine hours. If the mines resume with a full force, as it is claimed they can, it will give employment to from 600 to 800 men. The trouble is really very serious. It has practically paralyzed Cripple Creek, which was an active and promising camp. It is to be hoped an early and amicable settlement will be reached.

The New Wilson Bill.

The Wilson bill, as it passed the lower house of Congress, bids fair to be materially modified by the Senate. The Democratic members of the Senate Finance Committee, after having considered the measure for a number of days, have laid it before the full committee, and in substantially the same shape it is certain to go before the Senate. In some respects the amended bill is an improvement, but in others the same objections obtain as were formerly urged. The particulars in which western mineral interests are affected, and in which changes are suggested by the committee, may be enumerated as follows:

The amended bill makes the duty on iron ore 40 cents per ton, and it is free under the Wilson bill. Pig iron, spiegel Eisen, etc., are taxed at 22½ per cent., and the Wilson bill duty is 20 per cent.

Iron slabs, blooms and other forms more advanced than pig, and less finished than bars, 25 per cent; Wilson bill, 22½.

Lead ore and lead dross, three-fourths of one cent per pound; provided that silver ore and all other ores containing lead shall pay a duty of three-fourths of one cent per pound on the lead contained therein, according to the sample assay at the port of entry.

Miscellaneous metal articles not otherwise provided for, 30 per cent; under the Wilson bill, 25.

Coal—Bituminous and shale, 40 cents per ton; coal slack, 15 cents per ton; cokes, 15 per cent ad valorem.

The bill as now presented fixes the duty on boracic acid and refined borax at 20 per cent in each case; in Wilson bill boracic acid is on the free list.

So far as California is concerned, free coal and free iron are wanted; and the change may be regarded as not beneficial to California interests. But the State of Washington is found to take quite a different view of the matter, and to regard it with favor.

The concession made to the lead and lead-silver interests is material. In fact, there is a complete change in the policy of the bill in this respect, in that the ad valorem feature is abandoned and the specific duty of the existing tariff restored. Under the Wilson bill it was proposed to impose a duty on lead dross of 15 per cent ad valorem, and to allow all lead in ore which is higher in silver value than lead to come in free of duty. The value of lead dross at Mexican ports of entry is not above 1½ cents per pound, and the average duty would therefore be about 1-5 cent per pound. It is evident that the abuses of the old half-and-half system were urged upon the committee and were influential in bringing about the change. It is well known that under the operation of the former provision the effort of importers is to convince customs officers that ore is more valuable for silver than for lead, and that there is in consequence strong incentive to corrupt practices. The Wilson bill pretended to impose a tariff of 1 cent per pound on all ore more valuable for lead than for silver; but the ½-cent duty on lead all around will, we believe, be a great deal more satisfactory, and in its actual operation will be more effectual and more remunerative to the Government than the 1-cent duty. In our judgment, the lead-silver interests of the United States are distinctly the gainers by this amendment.

Nothing has been done for quicksilver or petroleum.

Of course, the bill has not been accepted in its present shape by the Senate. All opinions as to its fate there are mere guesswork. It will certainly meet powerful opposition, in its entirety and in its special features; but the chances seem to favor its passage, notwithstanding the reported defection of several members of the party pledged to support tariff reform. It must be remembered, however, that the amendments of the Senate, if made, must still be concurred in by the House, which declared overwhelmingly for the Wilson bill.

The Chilean Exposition.

The following dispatch from Washington, under date of March 14, is of importance to mining men:

Secretary Gresham has written a letter in which he recommends to Congress that at least \$5000 be appropriated to enable this Government to participate in an exposition of minerals, mining machinery and metallurgy that is to be opened at Santiago, Chile, in September next. Our Minister, James D. Porter, has written to the State Department, setting forth the advantages to be gained by taking part in this display.

The director of the Geological Survey says officially that it would be desirable to enter into the exposition, and that a reasonably satisfactory display might be made for the amount recommended. The Chilean government is making great efforts to create a successful affair out of the project, and is meeting with much success. Senor Don Anibal Cruz, first secretary of the Chilean Legation, speaking for Minister Gana, said to-night:

"We wish to aid in opening up the vast mineral resources of our country by inviting the attention of foreign capital to the great wealth which awaits development, laying bare in our mountains. We want to show our people the advanced methods of mining and modern machinery

of the latest type, so that they may be led to discard the old and primitive methods for new and more profitable plants. Mining in Chile is in some places carried on with machinery from abroad that will compare favorably with that of many countries, but for the most part our plants are moderate in size and of such fashion that a comparatively small portion of the value of the ore is recovered. There are enormous bodies of tailings in various parts of Chile which, if worked over by modern machinery, would yield safe and sure profits of great value.

"Naturally we look to America as the nearest and most desirable point from which to obtain mining machinery of the latest and most improved pattern. We expect to consume great quantities of it in the years to come, but so far America has shown but little inclination to push its trade with us in this line, and we have bought large plants from Great Britain. To show you the extent of our project I will say that we have appropriated \$150,000 for the initial expenses of the enterprise. This put into buildings means as much as \$250,000 in America, where labor and materials are so dear. We have invited all the nations of the earth to take part, and we are already receiving applications for space from manufacturers and other interested persons in America, even from Canada. Our government will pay the cost of conveyance by land or sea, or both, of all exhibits, and in the case of such as are not sold within one year from next September will send the exhibits back home free of charge.

"While in Chile goods will be regarded as in private bond, and no duty will be collected upon them unless they are sold or left in our country over one year. We also bind ourselves to pay the passage money of all such operatives as it may be necessary to bring out, erect and run the machinery exhibited—not only to Chile, but home again. We will furnish free motive power, tables and show cases, so that the cost of installation will be only the necessary expenditure connected with exhibits.

"We shall give medals of three classes, and every effort will be made to have the awards fairly made. Each jury will consist of three Chileans and two foreigners, and there will be a court of appeal. The precise date when the exposition will be opened is not settled, beyond that it will be in September. It will run for six weeks or more. Applications for space should be addressed to the Chilean Legation at Washington, D. C.

"We have watched with great interest your big Midwinter Fair in San Francisco, and we congratulate you on your signal success. It reflects great credit on your people. We hope that some of the mining machinery exhibited there, which we believe is of California manufacture and equal to any made elsewhere, will find its way to Chile."

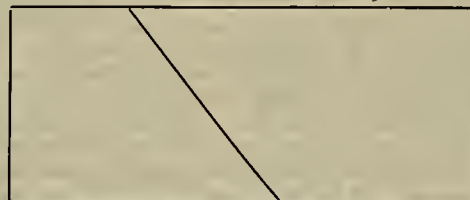
An Important Decision.

The United States Supreme Court has rendered a decision in a Montana mining case which may be of great importance. The full text has not been received, but the gist of the decision is contained in the following telegram from Washington to a Butte lawyer:

Court reverses. Holds any side line is end line. Directs partition, or if that impracticable, sale and division proceeds. No dissent.

This decision affects the Non-Consolidated-Amy & Silversmith controversy. Until the full opinion is received, just what effect it will have on a number of important mining lawsuits now pending cannot be determined.

In the case just concluded the court holds that what the Amy people claimed were the side lines of their location are the end lines. It is a well-settled proposition of law that a miner cannot go beyond a vertical point of his end line in following the dip of his vein, but he may follow it, on its dip, beyond the side lines to any depth. That this may be better understood, the diagram below is referred to:



The Non-Consolidated lode is a small claim at the north-west end of the Amy & Silversmith. The line drawn diagonally shows the course of the Amy vein as indicated on the surface. The long lines, which run east and west 1500 feet, are what have been the accepted side lines of the Amy lode. The vein dips to the north into the Non-Consolidated; and by the Supreme Court decision, the Amy people have no further claim to the vein beyond the point where it passes beyond the north line.

As several lawyers about town understand it, this decision does not affect locations made upon the vein for a distance of 1500 feet. In the case of the Amy, however,

it appears the location was made only 600 feet along the vein. When the location was originally made, it is evident the course was thought to have been due east and west, and not northeast and southwest, as later development proved.

It is believed there are not a great many locations of this nature, hence the decision may affect only such locations as cut across the vein instead of running parallel with it. Where the apex of vein is shown on the surface, the survey line, that crosses the apex, becomes the end line, whether it is marked as the side line or end line. This is believed to be the correct interpretation of the decision.

California Mines at the Midwinter Fair.

Nevada County.—Greater space has been assigned for exhibit of the mineral wealth of this county than any other, for the sufficient reason that it is the largest and most important district in the State, in point of output, though it has several good seconds. If the energy and judgment displayed in gathering this exhibit are a criterion of the activity of Nevada county's mining men generally, they are likely to maintain their prestige for some time to come. The location is in the northeast end of the Mineral Division, Mechanic Arts building, fronting the northeast aisle, and extending from the center aisle to the northern aisle. The exhibit is really a fine one. An idea of its extent may be obtained when it is stated that something like 60 tons of ore alone are one of its conspicuous features. The value of the exhibit lies in the fact that it is representative of mines actually working, showing all varieties of pay ore from depths of 500 to 2000 feet, and designed further to illustrate the extent of the workings and the strength and permanence of the lodes in the several Nevada mining districts. The largest single piece of ore is from the Osborn Hill mine—a property abandoned for many years, by the way, but of approved merit and now prosperous. It weighs 3000 pounds. Other pieces of all weights less than the maximum figure are shown from about 30 operating mines.

One interesting thing is a mass of ore from the famous Idaho-Maryland mine, showing the width of the vein, pieces of the hanging and foot wall being attached to the quartz. In a glass case is also exhibited a piece of quartz, weighing several hundred pounds, from the Maryland extension of the Idaho which took first premium at Chicago as the finest specimen of California gold ore. It is shown by S. P. Dorsey, now principal owner of the Idaho-Maryland. In this connection, Mr. John A. Coleman, of Coleman Brothers, has just furnished Mr. Chas. H. Mitchell, who is in charge of the exhibit, an exact statement of the Idaho mine from 1869 to 1894, under the Coleman proprietorship. The total yield was \$11,639,360, out of which 279 dividends were declared, amounting to \$5,074,700. It is well known that the old Eureka, the Idaho and the Maryland properties adjoin on the same lode. The former produced \$3,500,000, and there is every indication that the Maryland will do as well, making the Eureka lode by all odds the richest in the United States.

The North Bloomfield mine displays a model of what was probably the largest gold brick ever cast from one run in California. The weight is 6,117.78 ounces troy; fineness, .897; total value, \$114,280.72. The cleanup was made shortly before the mine shut down, by order of the courts.

In two glass cases, occupying a conspicuous position, are shown in glass ore in its various conditions from the time it leaves the battery until it emerges in gold bars. These exhibits are by the Champion mine of Nevada City, and Omaha Consolidated, of Grass Valley. There are shown successively pulp from batteries, sulphurets, sulphurets after roasting, gold in solution, gold precipitated, tailings, amalgam balls, gold bar. Besides these, the Omaha shows in one jar pure quartz, copper pyrites, iron pyrites, sulphurets from concentrator, tailings, gold in quartz, pulp from battery plates, sulphurets after roasting. These altogether make a very instructive and attractive display.

The copper exhibit of the Imperial Paint and Copper Company of Spenceville is complete. Its chief features are cement, copper and mineral paint, besides copper, ingots and copper in various solutions. Fine views of the mine and surface works at Spenceville also appear.

A 2700-pound specimen of hematite iron ore from Indian springs, nine miles west of Grass Valley, attracts much attention. It contains 54 per cent iron. No attempt has been made to develop the deposit, and there is no prospect that there will be as long as English and Puget Sound vessels bring pig iron to this port in ballast at a very low figure.

A sedimentary stone from Truckee basin is called fire-proof building stone. It is said to outlast two sets of fire brick.

Black marble from near North Bloomfield is shown. It

takes a high polish, and looks like it ought to have commercial value.

In the way of the curios, a large collection of petrifications from You Bet is displayed. One very interesting petrification is a brook trout, six inches long, firmly imbedded in petrified wood. It was found 100 feet underground.

The showing of auriferous gravel from Nevada City, North Bloomfield and other places is not yet complete.

Mention of the great gilded globe, designed to show the bulk of Nevada's gold output, should not be omitted. It occupies a central position in the exhibit, and from its size and color elicits a great deal of favorable comment. The ball is 10.4 feet in diameter and contains 629.59 cubic feet. It is an exact representation of a gold mass worth \$205,000,000, which, according to conservative estimates, is Nevada's gross gold output.

The exhibit is in charge of Mr. Charles H. Mitchell, under whose supervision it was collected, and who is always at his post ready to explain its various features and merits. A summary of the exhibit is as follows:

Quartz from the following mines: Idaho mine of Grass Valley; the Maryland, on the same lode; the Omaha, North Star, Original Empire, W. Y. O. D., Menlo, Osborn Hill, Perrin and Ben Franklin, Champion, Providence, Federal Loan, Spanish Mayflower, North Banner and Gold Flat, St. Gothard and Defiance, National and Mistletoe.

Other exhibits are: Copper ore and products, including copper paint and fire-proof mineral paint, mined and manufactured in the county; fire-proof building stone from Truckee; stone furnace lining and black, polished marble from North Bloomfield; model of the largest gold brick ever cast in the State (\$114,280), the product of one run from the North Bloomfield mine; gold-bearing cement, gold-bearing gravel, wood petrifications and mineralized gravel from the same mine; gold-bearing gravel, fine gold, iron pyrites, clays and wood petrifications from the Odin gravel mine of Nevada City; copper and gold-bearing ores from the Bulwer mine; copper ore from the Jackson mine; wood petrification from You Bet; high-grade copper ore from the Bull Run mine of North Bloomfield; gold-bearing quartz from the German mine in the Washington district; prize piece of gold ore at the World's Fair at Chicago from the Maryland mine; models of gold specimens and bricks, amalgam, pulp, concentrates, raw and roasted sulphates, gold precipitants and chlorine gold, showing the process of gold extraction from the ores; hematite iron ore from Indian Springs; crayon drawing of underground workings of the Merrifield mine at Nevada City; photographs of the Federal Loan mine, the North Bloomfield dam and mine of the Copper Paint Works at Spenceville, of the Champion mine and of the Omaha Consolidated mine.

Mono County.—Two huge gilded blocks surmount an arch leading into the exhibit of Mono county. They represent respectively the gold and silver outputs of the county and are appropriately lettered. The silver yield is 4,000,000 ounces, the gold 1,433,000 ounces, or \$26,120,000. The location of the exhibit is in the western part of the mineral section.

The exhibit, as a whole, is small, but choice. A leading feature is a number of slabs of travertine, said to be from the only quarry of the kind in the United States. It was discovered last fall by W. E. Lindsey of Carson City, Nev. The location is one mile from Bridgeport. The travertine is highly colored and susceptible of a fine polish. An effort is to be made to develop the deposit.

Models of the workings of the Standard Consolidated and Bulwer Consolidated mining claims, above the 300 levels, are shown. A number of views of the electric plant of the Standard are suspended from the walls. A size model of a double-deck mining cage with safety clutch, made by Andrew Smith, attracts the visitor's notice.

In the way of curiosities, the most noticeable thing is a section of a tamarack tree, in which is partly imbedded a pair of deer's antlers, said to have been hung across a limb by the Fremont party, in Lost canyon, 1845.

In detail the exhibit contains:

Gold quartz from the Charleston mine in the Mono lake district; gold quartz from the Jackson and Lakeview mine in the Homer district; gold ore from the Golita mine in the Jordan district; gold quartz from the Bulwer Consolidated mine in the Bodie district; gold ore from the Standard Consolidated mine in the Bodie district; gold quartz from the Josie Green mine in the Homer district; silver ore from the Patterson mine in the Patterson district; gold quartz from the Bodie Consolidated mine in the Bodie district; copper ore from the Golita mine in the Jordan district; model of the Bulwer Consolidated mine; model of the Standard Consolidated mine; model of square-set timbering; model of mining cage, patented and owned in the county; pictures of mining scenes, 37 views; full set of mining tools in miniature; specimen cases of gold, silver, copper, sulphate of iron, petrified wood, quartz, crystals, flint arrow heads; specimen case of free gold, and nuggets from the Dogtown, Big Emma, Bonanza, South Bulwer, Bodie, and Golden Prince mines, in the Mono Lake district; building rock of lava formation, Mono lake specimens; section of a tree from Lost canyon, in which a pair of deer horns were hung 45 years ago by the Fremont party; sun-burned travertine, found 7000 feet above the sea level; agatized plant.

There is nothing satisfactory in the smelting situation in Colorado, or for that matter anywhere in the world, says the *Denver Mining Industry*. The decline in the price of silver is reducing the ore supply very rapidly. This means a great reduction in the product of the smelters, while expenses are not, and cannot be, reduced to correspond. The smelting companies have gone to the extreme limit they can go in reducing smelting charges in order to encourage greater ore production by miners. A further reduction would mean increased losses, and probably every concern would prefer to go out of business rather than to risk them.

Slitkens.

The Congress mine, near Prescott, A. T., has been sold for \$1,500,000, so it is said.

The new Everett, Wash., smelter made its first shipment of 30 tons of bullion to San Francisco on March 1st.

The Standard Con. Mining Company has paid a dividend of 10 cents per share. The company had over \$40,000 on hand on the 1st. The dividend will take \$10,000.

The February report of the De Lamar Mining Company, whose product is three-fourths gold, shows a total production of \$82,330; estimated profit, \$46,139.

"CAPTAIN GOLD," the Hydah Indian who discovered gold on the islands near the British Columbia coast, died at Skidegate some weeks ago. His title was given him because of his discovery.

The upper Kootenay papers are awakening to the necessity of building concentrators, as, for every ton of high-grade ore shipped out, a dozen tons of proper food for concentrators are exposed.

The Utica Mining Company at Angels, Calaveras county, has begun the erection of a private hospital for its employees. Trained nurses will be in attendance and every comfort will be provided for sick and injured miners.

Excitement prevails at Needles over the new gold fields at Goldstone. Assays from five claims show from \$175 to \$1100 in free gold per ton. Rich strikes are also reported from the desert country 60 miles from San Bernardino.

STATE COAL MINE INSPECTOR REX of Colorado has returned from a tour of inspection of the mines in Las Animas and Huerfano counties. He did not find a single mine where the wages of miners were not from two to five months in arrears.

The Boston & Montana Company has announced a dividend for March of five cents per share. This company's annual report will soon be out and it is announced it will show that the company can produce copper as cheaply as any company in the country.

Work was suspended by the Anstin (Nev.) Mining Company last week on account of litigation against the company. This throws about 100 men out of employment, many of whom have large families. Efforts are being made to make an amicable settlement of the dispute, so that work may be resumed.

ARTICLES of incorporation of the Hecla Mining and Milling Company have been filed at Grass Valley. The company is incorporated with 100,000 shares, of which 40,000 have been subscribed. The directors of the company are J. C. Roberts, D. N. Coffin, W. A. Hawley, Wm. M. Blair and John Roberts. The Hecla mine was formerly known as the Kate Hayes mine.

A GOLD-BEARING ledge has been struck a short distance east of Truckee which prospects very well and has every indication of being a rich find. The ledge is quite large, and already several tons of rock have been extracted from it, every piece of which shows well in free gold. As the owner has sunk but a short distance, it is not known yet whether the ledge increases or decreases in richness and size as it goes down. Truckee is basing better times on the find.

The annual meeting of stockholders of the Hale & Norcross Mining Company was held Wednesday afternoon in the Nevada block. The amount of stock represented was 105,390 shares. Following were the officers elected for the ensuing year: President, Nathaniel Messer; vice-president, W. S. Lyle; secretary, A. B. Thompson; superintendent, Joseph R. Ryan. The report of the secretary showed \$12,353.92 on hand at the end of the year, February 28th.

MR. JOHN TRELOAN has resigned the superintendency of the Wildman mine, Amador county, the resignation to take effect on the first of April. Who will be his successor is not yet known there. Mr. Treloan has had this step in view for some time and was only deterred from resigning several months ago by the earnest wishes of the company that he continue in charge. He retires to enjoy the repose earned by over 60 years of active service in mining operations.

The Eureka mill on the Carson river is making a final clean-up and will cease operations altogether, says the *Dayton Times*. It is rumored that some Chicago people have purchased all the tailings owned by the Nevada Mill and Mining Co., and that a new process will be introduced to work them in the near future. There is not much hope, however, that operations will be resumed with silver at 60 cents an ounce. The closing of the mill will throw a number of Daytonites out of employment.

A RECENT letter received by officer Bowman at Virginia City from George Sanford, now located at Montgomery, down in the southern corner of Nevada, on the border of Death Valley desert, gives a favorable account of that district. The writer says the nearest store is in Vanderbilt, 110 miles away. He broke his pipe on the trip there and could not replace it without sending to Vanderbilt. He says there is lots of gold in Montgomery and a stamp mill is about to be erected there. Miners receive \$4 a day, but the price of living is high.

The *Vale (Or.) Gazette* says that quite a good deal of interest is being manifested in the gold fields on Snake river, and many of the citizens of Vale and vicinity are now going over there with tents and lumber, preparatory to putting in the summer taking out the shining needful. The mines are a little over 20 miles from Vale, yet it is the nearest supply point for the energetic miners. At present about 35 men are working claims there, which pay from \$2 to \$12 to the man. The mines are old gravel beds, and the gold is flour gold that goes from \$17 to \$19.

The steamship Bawnmore, Captain Woodside, the first vessel that was ever fitted with tanks in San Francisco for the purpose of carrying crude oil in bulk, has left her anchorage in the bay and gone to Oakland to take coal from the Servia Cadena. She will start for Telara Bay, in Peru, on Wednesday to secure her first cargo of oil. The Bawnmore is under charter to Grace & Co., the charterers agreeing to make all the alterations in the vessel; to guarantee 2865 tons of oil each voyage, for which they guarantee to pay \$4.20 per ton, a five-days "lay" being allowed at each port. There are 14 huge tanks for carrying oil, and the steamer is fitted with every precaution against accident.

River Mining in Sierra County.

Slightly Abridged from Correspondence in the Downieville Messenger.

There is no doubt that many rich bars or banks still exist in rivers, gulches, creeks and ravines in all the mining counties of this State. From some of the numerous auriferous streams of Sierra county fortunes are extracted by their industrious owners, of which very little is known to the outside world. In many instances they work over the tailings that are run annually down from the surrounding mines, yielding a handsome profit every year. The well-known Slate Creek basin, Slate and Canyon creeks, and their tributaries, have yielded millions and millions of dollars by working them over and over again. From Rock creek, below Scales, several hundred thousand dollars have been taken out by the lucky ones in working the tailings over that are poured in there more or less every year from Scales, Union Hill and Fair Play. All branches of Canyon creek above Poker Flat, and those of Slate creek, have yielded fabulous sums of gold, of which wonderful stories are related by the few remaining pioneers of the early days while mining was flourishing.

The Slate creek bed has been worked but very little, as it was soon covered with tailings that are poured into it from the early-discovered, so-called hill diggings. It was only worked in shallow places, with insignificant appliances then in vogue, but with immense results. All those creeks fed the Yuba river, which became world-renowned in days gone by for its wonderful yield. The late Major Downie, the founder of Downieville, told that when once moving camp from the Yuba, to look for still richer diggings, the partners quarreled among themselves about who should carry the heavy gold dust in the heat of the day, when traveling over the mountains without trails or roads. Where tailings have been washed into these streams they are practically worked over again by innumerable small companies, in many instances under great difficulties, and all with more or less profit. Even at Bullard's bar, in the Yuba river, below the mouth of Slate creek, where the same has filled up with the lighter tailings from the great Slate Creek basin, they are now worked partially over and over again every summer, yielding from \$5 to \$25 a day, to each man, by shovelling and washing them in sluices, soon after the freshets have subsided.

On the Slate Creek basin we find two of the largest "river" or "tailing mine enterprises" of unquestionable richness in the bed of Slate creek that have been promulgated. One, commenced during the last year by Hon. J. W. Moyle, ex-State Senator of Sierra county, large stockholder of the Slate Creek Gravel Gold Company (Limited), an English syndicate formed by himself and friends in London in February, 1893, with a capital stock of \$500,000, to mine the auriferous rich tailing deposits and gravel beds, etc., in Slate creek. They control about two miles of the same above St. Louis bridge. After having prospected the accumulated tailings and finding a yield of from one-half to two ounces of gold a day to each man, they commenced last spring with a very large force of men to work and develop their recently acquired property, expending nearly \$100,000 last year in building a steam-power sawmill, a ditch over three miles long and more than five feet wide, and purchased a large supply of heavy iron pipes and varied expensive machinery of every description, said ditch to deliver water at its lower end into a pipe, whence it is carried through the same to the creek at St. Louis bridge, to be used under 275 feet pressure in connection with an immense hydraulic elevator, already on the ground near the St. Louis bridge, where General Superintendent Moyle commenced last fall with a smaller elevator to sluice out a large pit or sump in the once over 50 to 60 feet of deep of tailings to reach bedrock, on which to anchor the larger machine which is used to suck and lift the gravel from the bedrock into a flume set along on the Slate creek hillside, paved with blocks. This sump has reached a depth of 20 feet, but on account of the extreme cold weather at the head of the watershed everything froze up and operations had to be delayed until milder weather would permit them to proceed with their developments. They have built above this sump, across the creek, a substantial dam of log cribs filled in with rocks.

It is predicted that if this company is able to work this ground with these appliances and their outlined plan, they will take out more money than has been obtained from the best-paying mines in Plumas or Sierra counties, as these accumulated tailings and the original gravel in Slate creek are immensely rich in gold, as proven by Brewster and Haworth 20 or 25 years ago, when they owned a tunnel through the long point under the St. Louis road, enabling them, after drawing off to some extent the tailings for a short while at the upper end of said tunnel, yielding \$8 to \$25 a day to the man, shovelling tailings into sluices. The following season they were prevented from working any more, on account of the introduction and working of sev-

eral dozen monitors in the hydraulic gravel mines on the channels above them, soon burying the upper and lower ends of said tunnel, including bridges across the creek, out of sight.

What has been said about the richness of the valuable mining properties can be applied to the Alturas mine, below said St. Louis bridge. That mine is about three miles long, owned by Hendel & Packer, who already have expended over \$105,000 in trying to open the whole of Slate creek above them, from their lower end at the Port Wine bridge where they have been steadily, quietly and tenaciously at work, for over a quarter of a century, in blasting a long bedrock cut, of about 20 feet in width by 5 to 40 feet in depth, and excavating several large tunnels through projecting, long, sharp bedrock points at the bends or elbows of the creek, to busband the grade and obtain more fall for their bedrock ground-sluice or flume.

They worked successfully last year only late in the season with about 30 men by shovelling tailings and the creek gravel into iron buckets of an endless link-belt machine, manufactured in the East, to elevate the gravel into elevated sluices, all operated and washed by the same water, obtained through an iron pipe attached to one of their ditches. The tailings, after being washed, are dumped on the banks outside of the creek, thus giving them as they advance a good drainage to clean up the exposed bedrock crevasses in which the richest part of the claim is found, when the tailings and gravel have been reduced by the spring floods, and washed during the mining season. The buckets are twenty inches long and two feet wide, and have a half semi-circular shape. They are fastened eight to ten feet apart to the two parallel link belts. These belts glide along on rollers near the bedrock, enabling the men easily to shovel the gravel into the buckets as they silently and steadily move along up to a tower, where, in turning over a large drum or wheel, the gravel empties into a large sluice box underneath, and is carried along through the sluice, thus washing the gold from the gravel. This is a cheaper method of mining than has been done here before, when the gravel had to be shoveled high—two, three and four times over before reaching the elevated sluices, so that, after entering the creek again, men had to be employed to shovel and throw the washed gravel below the sluices into large piles to leave a drain open for the water at the workings and for the washings, all of which is now obviated. The links are 12 inches long, and are so constructed that they can be easily taken out or more added to the chains, if required, in a moment, as the workings of the bed of the creek may require. The tailings in this creek are 250 to 500 feet in width, and 5 to 40 feet, formerly 50 to 60 feet, in depth. This company worked a very small portion last year, the best of which yielded over \$5000 from only 100 square feet. Their pay-roll was more than \$8000 during last year. The gold averages over 900 fine. They will work this year two such machines, each one on very rich ground, that they have already developed, and as they will be in a better condition than ever before to work to greater advantage, they will give employment to 60 or 80 men this season. Creek tailings always proved very rich when they could be worked with advantage. Many fortunes were realized from the partial working of ravines, creeks and gulches that are tributary to the very little worked Slate creek, estimated by many to contain half as much gold as the channels above have thus far yielded. Hon. B. Barnes, ex-internal revenue collector, of La Porte, Plumas county, estimated that they have reached, to the end of 1891, the sum of \$132,132,000, as per his interesting communication made to the *Oroville Register*, published Feb. 25, 1892, in regard to the "Richness of Plumas County." He refers to the days when such mines as the Conly & Gowell claims, at La Porte, took out in one clean-up \$271,000; also that on the 18th of May, 1858, he accompanied F. D. Everts, of the express firm of Everts, Wilson & Co., when taking from La Porte on several mules \$250,000 in gold dust as only one of a tri-weekly shipment during the clean-up season. In those days Messrs. Cox, Knowles & Fant realized from tailings, in one season's work, over \$20,000 from a ravine below the Howland Flat mines.

That such river mines are rich there is no longer any doubt. Those of the Comstock are estimated at 20 to 40 per cent of the diggings worked in early days; for Slate Creek Basin, 25 or more per cent of the gold product of the gravel channels worked above them. If so, they would not amount to over \$33,000,000, in addition to the value of gold obtained in the original, which is incalculable.

THE MINING AND PROMOTING COMPANY.—Articles of incorporation of the "Mining and Promoting Company" have just been recorded here. The purposes for which the company is formed are to prospect, to buy and sell on commission or otherwise, to bond and lease mining properties, etc. The directors of the company are A. H. Rapp, M. E., president; General Charles Forman, vice-president; Hon. C. S. Young, secretary; Charles E. Shafer, C. E., and C. D.

Galvin, C. E. California Safe Deposit and Trust Company, treasurer. The main offices of the company are rooms 94, 95 and 96, Crocker Building, San Francisco. The other offices are: One with General Forman, Potomac Block, Los Angeles, and the other with C. D. Galvin, Esq., 26 Van Buren street, Chicago, Ill.

Locations on Mexican Land Grants.

Delegate Josef of New Mexico has introduced a bill to authorize locations of mines of precious metals situated in Spanish or Mexican land grants. The mineral-bearing parts of these lands are, by act of Congress, the property of the United States. The complication of rights is now such that neither the owners of the grants nor anybody else can develop the mineral resources of these grants. The bill reads as follows:

"Any gold, silver or quicksilver mines, or other valuable mineral deposits belonging to the United States, and situated within exterior boundaries of any tract of land held, claimed, allowed, confirmed or patented by the United States, to or by any person or persons, under and in pursuance of an act entitled 'An act to establish a court of private land claims, etc.,' approved March 3, 1891, and hereby declared to be free and open to location, working and purchase by citizens of the United States and those who have declared their intention to become such, and in the same manner and subject to the same laws and regulations are or may be applicable to mineral deposits in lands belonging to the United States.

"In case the claimant or owner of any such land under any grant from Spain or Mexico, allowed, confirmed or patented by the United States, shall not consent to the location, working and purchase of any such valuable mineral deposits as aforesaid by the discoverer or locator of the same, and to the reasonable and necessary rights of ingress, egress and occupation of and upon the said land in which the mineral deposits are situated, for the purpose aforesaid, it shall be lawful for such owner or claimant of said land to bring suit in any court of general jurisdiction within which the land is situated against such discoverer, locator or possessor of such valuable mineral deposits, for the recovery of any damages to land occasioned by such location, working or occupation of the same, or by such ingress and egress to and from the same over the said land. But such right of action shall not be construed to authorize such claimant or owner of said land to prevent or interfere with the occupation and working of any such mine or mineral deposit, provided the discoverer, locator or possessor of the same shall give bonds, with sufficient sureties, in such amount as the court may direct, to such owner or claimant, conditioned for the payment of such damages to said land as may be recovered in such action.

"All acts or parts of acts in conflict herewith are hereby repealed."

Chrome Cast Steel.

One of the busy establishments of the times is that of the Chrome Steel Works of Brooklyn, N. Y., whose product is the well known chrome cast steel. The abundance of orders which has kept these large works running full time with full number of hands during the past year, despite the lengthy period of general trade dullness, speaks volumes for the high favor which this material has obtained in this country.

Chrome steel differs essentially from ordinary steel in the substitution of chromium for carbon in its manufacture. It is very hard, tough and dense, will not deteriorate by the continued application of great heat, and can be worked successfully in large masses. These qualities adapt it specially for the manufacture of such castings as gears, wheels, pinions, hammer dies, etc., for general machine construction. Its use in this connection is extending rapidly.

Chrome steel is also particularly well suited and desirable for the manufacture of castings for stamp mills for mining; in fact, reports of its use for such work are flattering in the extreme. Many mining companies throughout both North and South America have discarded the use of iron or ordinary steel battery-shoes and dies, cams, tappets and hoes, crusher-plates and roll-shells, which they have heretofore been using, for those made of chrome steel. The shoes and dies that are made of this particular kind of steel, it is claimed, will not cup; neither will the shoe break at the shank. They will, moreover, wear evenly from end to end, thus crushing more ore than shoes and dies of iron, which, as all millmen know, wear irregularly and are in the main short-lived. The State Mineralogist of California, in his eighth annual report, says of chrome cast-steel shoes and dies, as used in the Patterson mine (page 656): "One set of iron shoes and dies lasted six weeks and crushed about one thousand six hundred and eighty (1,680) tons, while one set of chrome steel shoes and dies is said to have lasted fourteen months, and wore even, which indicates a crushing of sixteen thousand eight hundred (16,800) tons, or just ten times the amount crushed by iron."

In addition to the foregoing, we notice the following in an annual report made by the president of a prominent gold mining company of Nova Scotia, viz.: "The shoes and dies of chrome steel, made by the Chrome Steel Works of Brooklyn, N. Y., have done admirable service, being replaced only after crushing 3,300 tons of quartz ore. From data of other gold mills at hand this would seem to show a remarkable capacity for work, and not either on account of the softness of the ore, for, on the other hand, the quartz is fairly hard and sharp."

A combination welded chrome steel and iron five-ply plate is another popular form in which chrome steel is furnished. These plates have been used for years past in the construction of safes and vaults of the largest financial institutions throughout the country. They are absolutely burglar-proof, for no tool, no matter how finely made and tempered, can cut, drill or saw them. They are composed of alternate layers of chrome steel and iron, welded together.

Every one interested in the economical use of castings and the construction of burglar-proof work should investigate the merits of chrome steel products, if they have not already had their attention drawn to this really wonderful material.

Mr. H. D. Morris, 220 Fremont Street, San Francisco, Cal., is the agent of the Chrome Steel Works on this coast.

The Red Point Drift Gravel Mine.*

By C. F. Hoffmann, Mem. Tech. Soc'y.

In Three Parts.—Part II.

The gold is mostly in the form of what is known as "scale gold," consisting of flakes resembling fish scales, or the scaly particles in bran. In places, however, there are streaks of coarser gold and occasional nuggets of one or two ounces weight.

Size.—A number of "cleannops" were passed through a series of sieves of different meshes to determine the percentage of coarse, medium and fine gold. They were included under the heading:

Coarse Gold.—All that will not pass a sieve of 10 meshes to the inch. There are required from 600 to 700 of the finer colors of this class to weigh one ounce, and in these are included all colors, from the weight indicated up to the largest nugget.

Medium.—The remaining part that will not pass a 20-mesh sieve. This is more scaly and uniform in size, average 2200 colors to the ounce.

Fine.—The remaining part that will not pass a 40-mesh sieve, average 12,000 colors to the ounce.

Powder.—The remaining part having passed the 40-mesh sieve, colors too fine to count, average 40,000 or more to the ounce.

The following are the percentages by weight: *Coarse*, 15.78 per cent; *Medium*, 48 per cent; *Fine*, 36 per cent; *Powder*, 0.32 per cent.

Value.—The gold varies in fineness (purity) from .928 to .937, and the ounce is valued at \$18.90 net. The purest gold has been found where the largest streams of percolating water were encountered in the gravel breasts.

Distribution.—The distribution of the gold in the channel is very irregular. Most of the gold is found on the bedrock. In some sections, however, it is mainly in the gravel above. The richest spot in this mine was found in a layer of gravel from 6 to 12 inches above the bedrock. At this point the bedrock was hard and smooth, and the channel straight. Some of the gravel was scraped up by hand, and contained as much as 33 ounces to the pan. For two months the average yield was \$7.50 per carload of 22 cubic feet. It appeared as if the gold had been carried by a freshet which spent its force at this particular place.

Again, the gold is found in paying quantities in an upper layer, from 40 to 10 feet above pay streak on the bedrock. There is one rule which applies to this channel, and perhaps to others with beds of stratified rocks. The consecutive strata having different degrees of hardness will form riffles, so to speak, along or across the channel according to its course. Now, when the gold dust strikes these riffles it is washed along them in the direction deflecting least from the course of the stream and concentrates toward the rim. If it strikes at right angles it lodges in the center, or scatters to the right and left. (See Fig. 1.)

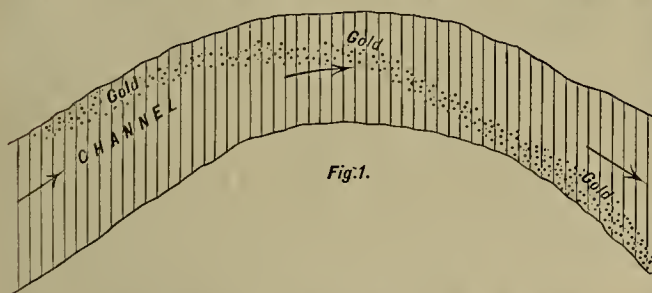


Fig. 1.

This rule holds good for the main bodies of pay gravel. Of course, if the bedrock is once covered it no longer governs the travel of the gold in this way, and this rule applies only to the pay streaks on the bedrock. In these main bodies the quantity of the gold again varies very much locally. It is generally found more abundant in cracks formed by the cleavage of the rock, at right angles with the strike, also around quartz veins, which are rough on the surface and hold the gold more readily, or where the slate is soft and thinly foliated. The gold dust will lodge in small pockets or pot holes and in cracks, to the depth of a foot or more. The lowest run in the channel contains very little gold, sometimes a little coarse gold, but the bulk of it is thrown on the sides or higher rock. It is also found more plentifully on the down-stream side of islands and very large rocks.

SYSTEM OF WORKING.

A main gangway is run as near as possible in lowest part of the channel, avoiding turns as much as possible. Cross cuts are run from this gangway every hundred feet, if practicable, toward each rim. They are not driven at right an-

gles to the channel course, but diagonally across it, so as to avoid cutting too much bedrock to keep the grade down. Arriving near the rim, where the bed raises rapidly, the grade is abandoned, and the rock followed up high enough to make sure that the true rim is reached. Generally the rim is indicated by sand and fragments of loose bedrock (float). The bedrock is so uneven and steep in places that car tracks on a higher level become necessary to facilitate the delivery of the gravel from the breasts to the cross cuts or gangway. These are about four feet above the normal grade, high enough to dump from one car into another. The cars running on these higher levels are of smaller size. In some places wheelbarrows are resorted to, and this makes the extraction expensive. The main gangway is kept ahead of the breasts as far as possible, and most of the breasting is done from the cross cuts and small car tracks. Blasting occurs only twice a day, at noon and 11 P. M., just before meal times. The roof being firm cement, no lagging is needed in timbering, only posts and caps are required. The posts, measuring not less than ten inches in diameter, are placed from six to eight feet apart, and sills are put under them where the bedrock is soft. Natural pillars of gravel are occasionally left along the sides of the main gangway and cross cuts, and at other points when the channel is wide. About one-third of the gravel consists of boulders exceeding five inches in diameter, and these are not removed from the mine, but are used in building walls between the timbers along the sides of the gangway and cross cuts to give further security against flaking and caving of the roof.

VENTILATION.

Heretofore the ventilation of the mine has been accomplished by a No. 4 Baker blower run by steam power, requiring 7.5 indicated horse power. However, quite recently a second blower (No. 4½ Baker) has been introduced. This is attached to a Pelton wheel, and will be run by water power for at least six months in the year. The air pipe used is eleven inches in diameter, and only one such pipe is required for ventilation, excepting where the channel is very wide. In such places a seven-inch distributing pipe is carried into the breasts, but usually the cross cuts and connections cause a sufficient circulation without such aid. The monthly cost of ventilation by steam power is as follows: (Average of six months.)

Two engineers at \$3.50.....	\$193 00
Thirty-three cords of wood at \$2.87.....	94 71
Oil, 6½ gallons.....	4 60
Eighty feet of new 11-inch pipe at 46 cents.....	36 80

Total.....\$329 11

This shows for 3064 carloads, 17 cents per carload.

TRANSPORTATION.

Four horses are needed for the transportation of the gravel, two on the day shift and two on the night shift. One extra horse is kept for reserve. One horse takes a train of six cars through the gangway to the chute, where the gravel is dumped. From the bottom of the chute, in the bedrock tunnel 44 feet below, the gravel is drawn in a train of ten cars, and the second horse takes it out to the dump house. The channel cars are iron dumpers of 22 cubic feet capacity. The tunnel cars have the same capacity, are also of iron, but the front ends are inclined and they are not dumpers. The latter are run out to the surface on to a self-dumping chair designed by Mr. H. C. Bebr. The chair turns upon an eccentric axis, and the gravel is dumped to the wash-log floor 30 feet below. The driver does the dumping. Each train has a break car attached to it. The total distance from the breasts to the dump house is 6514 feet, or nearly 1.25 miles, 3273 feet being in the channel gangway, and 3241 feet along the tunnel to the surface. The number of cars used in the mine at present is 30. The monthly cost is as follows: (Average of six months.)

Feed for horses.....	\$62 50
Wages of four drivers, at \$3.....	324 00
Wages of two Chinamen, at \$1.75.....	98 00
Car wheels, oil, etc.....	20 00

Total.....\$504 50

This gives for 3064 carloads 16 cents per carload.

COST OF LABOR.

The average cost of materials, transportation, ventilation and management is easily calculated, but the item of labor is more difficult to determine. It varies with the width and depth of the pay gravel, with the number of Chinese employed, with the unevenness of the bedrock, with amount of work in erecting new buildings and making other improvements, and with the labor required to protect the company's property in times of heavy snows and freshets.

The results of a number of figures give the following averages: Average number of men employed daily, 58.5 (22 whites and 38.5 Chinese). Average cost of labor per man, \$2.23. Average number of carloads extracted, per day's labor, 1.87.

This estimate includes all hands employed on the works, underground and on the surface.

A man breasting gravel will take out from 2.80 to 3 carloads a day, and sometimes a little more. This also depends on the depth and compactness of the gravel. As many as 220 carloads have been taken out in one day by the above-cited force.

The pay roll for six months, omitting the labor already cited under the headings "Ventilation" and "Transportation," shows an average of \$3169.75 per month. This gives for 3064 carloads extracted a labor expense of \$1.03 per carload.

COST OF MATERIALS

Of which only yearly inventories are taken (for the year 1892):

Timbers.....	\$931 87
Lumber.....	300 00
Hardware.....	585 18
Rails.....	391 90
Air pipe.....	342 00
Car wheels, etc.....	241 00
Sundries.....	120 93
Freight.....	575 47
Total.....	\$3,488 35
On hand (estimate).....	656 28

\$2,832 07

For one month.....\$236 00

MATERIALS USED IN ONE MONTH,

With an average extraction of 3064 carloads:

1191 pounds powder, No. 2, at 10 cents (average of 6 mos.).....	\$119 10
4800 feet fuse at \$6 per M.....	28 80
1766 caps at \$5 per M.....	8 83
615 pounds candles at 10½ cents.....	64 57
11 gallons coal oil at 26 cents.....	2 86
5 " engine oil at 65 cents.....	3 25
1½ " cylinder oil at 90 cents.....	1 35
6 " lard oil at 90 cents.....	5 40
11 " car oil at 35 cents.....	3 85
131 bushels charcoal at 20 cents.....	26 20
3662 pounds hay at \$25 per ton.....	45 77
1669 pounds barley at \$1.80 per hundred.....	30 04
33 cords of wood at \$2.87.....	94 71
Timbers, lumber, hardware, air pipe, rails, car wheels, sundries, freight, cited in the above yearly inventory.....	236 00

Total.....\$670 73

This gives, after deducting materials already entered in estimates of "Transportation" and "Ventilation," \$443.41, or 14½ cents per carload.

COST OF MANAGEMENT.

The monthly cost of management, including superintendent's salary, office expenses, traveling expenses, cablegrams, expressage on gold, taxes, etc., average of six months, \$649 or 19½ cents per carload. Total expense per carload is therefore as follows:

Ventilation.....	\$0 11
Transportation.....	16
Labor.....	1 03
Materials, etc.....	14½
Management.....	19½

Total.....\$1 64

PRODUCTION.

The total production during five years, from January 1st, 1888, to December 31, 1892, was 140,345 carloads, yielding \$308,245.40, or \$2.20 per carload. The total production of the mine has been \$363,473.60 from 5073 running feet of channel, or \$71.65 per running foot.

WASHING THE GRAVEL.

The dump house, in which the gravel is washed, has a floor 31 feet below the car track. This floor slopes from the two sides toward the center, which is provided with a sluice box 16 inches wide in the bottom, and having a grade of 15 inches to 12 feet. The gravel is dumped on to this floor and washed with the stream from a three-inch nozzle under 25 feet pressure.

The line of sluices, drops, etc., is as follows (beginning at the washing floor): 157 feet sluice boxes, vertical fall or drop, 30 feet; 11 feet ground sluice, 36 feet sluice boxes, 10 feet drop; 24 feet ground sluice, 182 feet sluice boxes. After this the gravel washes down a steep canyon with several falls and short sluices for a distance of 1500 feet, then passes through a double flume and over an under current.

The upper sluice is nominally divided into sections, the upper 59 feet being called the "Upper Sluice," and the lower 98 feet the "Lower Sluice." The next two sluices of 36 and 182 feet are called the "Canyon Sluices," and everything below them is credited to the "Tailings."

In the "Upper Sluice" no quicksilver is used, and it is

*The accompanying paper, of which an abstract was printed in the Press on Jan. 13, 1894, is a most important contribution to literature on the subject of drift mining. In response to numerous inquiries, and by permission of the Technical Society of the Pacific Coast (before which the paper was read), the full text is given.

How to Live Cheaply.

The Scientific Aspect of the Food Question.

We give below some reading especially pertinent to hard times. It not only gives information as to the nutritive value of various human foods, but presents very interesting economic information as to the cost of food. The statement is condensed from a paper by Prof. Charles D. Woods of the Storrs Agricultural Experiment Station in the Report of the New Jersey State Board of Agriculture:

The eating of food is a simple matter, but the ways in which its different constituents are utilized in maintenance of life are far from simple. Our bodies and the food we eat are composed of the same chemical elements, and the compounds of these elements in food are quite similar to those which make up the body. * * * The way of finding out how food is used consists in the comparison of the income with the outgo of the body. The body creates nothing for itself, either of material or energy. All must come to it from without. * * * The science of nutrition, as it is understood to-day, is a matter of definite quantities of income and expenditure, measured in terms of chemical compounds, and of heat and mechanical energy.

The chief two uses of food of animals are: First, to form the materials of the body and make up its wastes; and second, to yield energy in the form of heat to keep the body warm, and muscular and other power for the work it has to do. In forming the tissues and fluids of the body the food serves for building and repair. In yielding energy it serves as fuel.

The different nutrients of food act in different ways in fulfilling these purposes. The principal tissue formers are the protein compounds. These form the framework of the body. They build up and repair the nitrogenous materials, as the muscle and bone, and supply the albuminoids of blood, milk and other fluids. The chief fuel ingredients of food are the carbohydrates and fats. These are either consumed in the body or are stored as fat to be used as occasion demands. In being used as fuel the nutrients of the food tend to protect each other and the materials of the body from being consumed.

Heat and muscular power, like mechanical power, light and electricity, are forms of energy. The energy is latent in the food and is developed as the food is consumed in the body. * * * The value of food for fuel is expressed in terms of potential energy. The quantities of potential energy in food are determined by experiments with an apparatus called a calorimeter. The unit commonly used is the *calorie*, the amount of heat which would raise the temperature of a kilogram of water one degree centigrade (or a pound of water four degrees Fahrenheit).

Taking ordinary food materials as they come, the following general estimate has been made for the average amount of energy in one hundredth of a pound of each of the classes of nutrients:

In 0.01 pound protein.....	18.6 calories.
In 0.01 pound fat.....	42.2 "
In 0.01 pound carbohydrates.....	18.6 "

[Printed tables were distributed showing proportions of each of the three constituents in one pound of various kinds of foods.] The composition of cooked canned corned beef is of considerable importance. Its high content both of proteins and fats is due to the loss of water that comes from the process of cooking and preparation. It furnishes pound for pound more protein than the other specimens of beef, and nearly equals the highest of them in its potential energy. From personal observation also of the methods of its manufacture, I can recommend it as one of the most excellent and economical of foods.

The vegetable foods differ very materially from the animal foods in both composition and digestibility. For the most part they are not as completely digested, and more energy is used up in the assimilation of the digested portions than is the case with animal foods. So that in general a given weight of protein or fat from a vegetable food will not furnish as much material for the use of the body as the same weight from animal sources. * * * Beans are very rich in protein, and on this account are very valuable food. Corn meal differs from wheat flour in having more fat and less protein and carbohydrates. The total energy (food value) of these two foods is nearly the same.

In being consumed in the body to furnish heat and muscular energy the nutrients replace one another in proportion to their potential energy. * * * It has been estimated that a man, to keep his body well nourished, requires about 0.28 lb. of protein and sufficient quantities of fat and carbohydrates to furnish, together with that of the protein, about 3550 calories of potential energy. He would also need a certain amount of mineral matters and water. Sufficient nutrients to furnish that amount of potential energy would be contained in the following food materials, which would therefore suffice for a day's nourishment:

FOOD MATERIALS WHICH WOULD FURNISH NUTRIENTS FOR ONE DAY FOR A MAN AT MODERATE WORK.

KINDS OF FOOD.	Total Food Material, lb.....	Nutrients.				Calories of Potential Energy.....
		Protein, lb.....	Fat, lb.....	Carbohydrates, lb.....	Water, lb.....	
Beefsteak.....	.70	.124	.101			600
Wheat bread.....	1.40	.123	.024	.788		1,790
Potatoes.....	1.60	.031		.243		510
Butter.....	.18		.153			650
Total.....	3.88	.278	.278	1.031		3,550

These materials are daily expended in building up tissues, etc., and since the tissues are made up of the food, practically all the digested protein, fats and carbohydrates leave the body finally as urea, carbonic acid and water. The daily income and expenditure of the human body may be balanced in this way:

ESTIMATED DAILY INCOME AND EXPENDITURE OF THE BODY OF A MAN AT MODERATE WORK

Income—		Outgo—	
	Lbs.		Lbs.
Protein.....	0.28	Urea.....	0.10
Fats.....	0.28	Carbonic acid.....	2.67
Carbohydrates.....	0.99	Water.....	5.40
Mineral matters.....	0.06	Mineral matter (digested).....	0.04
Water of food and drink.....	4.40	Undigested matter.....	0.09
Oxygen.....	2.30		
Total.....	8.30	Total.....	8.30

The cost of food is the principal item of the living expenses of the people—of all, indeed, but the especially well-to-do. In the Report of the Bureau of Statistics of Labor of Massachusetts for 1884 there is summarized the results of investigations into the cost of living of people with different incomes. In Massachusetts, in Great Britain and in Germany, dividing expenses into those for food, clothing, rent, fuel and sundries, the percentage of the whole income expended for food is as follows:

	Annual Income.	Per Cent for Food.
Families in Germany—		
Workingmen.....	\$225 to \$300	62
Intermediate class.....	450 to 600	55
In easy circumstances.....	750 to 1,100	50
Great Britain—		
Workingmen.....	600	51
Massachusetts—		
Workingmen.....	350 to 400	64
".....	450 to 600	63
".....	600 to 750	60
".....	700 to 1,200	56
".....	Above 1,200	51

Although the cost of food is so great, and although the health and strength of all are so intimately connected with and dependent upon their diet, yet even the most intelligent people know less of the actual uses and values of their food for fulfilling its purposes than of almost any other of the necessities of life. People are afraid to economize in food, and will pay higher prices for a less nutritious article. The best food in the sense of that which is the finest in appearance and flavor, and which is sold at the highest price, is not generally the cheapest or the most economical, nor is it always the most healthful.

The New York *Tribune* coal and food fund have sent to many poor families in New York the following supplies, for which they paid one dollar:

KINDS OF FOOD.	Weight, lbs.....	Nutrients.				Calories of Potential Energy.....
		Protein, lb.....	Fat, lb.....	Carbohydrates, lb.....	Water, lb.....	
Hominy.....	5.0	0.400	0.190	8.580		8,225
Oatmeal.....	2.0	0.294	0.142	1.368		3,690
Cornmeal.....	5.0	0.450	0.190	3.530		8,225
Rice.....	2.0	0.148	0.008	1.588		3,260
Codfish (salt).....	2.0	0.312	0.004			410
Salt pork.....	8.0	1.848	0.160	4.796		12,920
Salt.....	2.0	0.018	1.666			7,010
Tea.....	0.5					
Totals.....	26.6	3.430	2.360	14.752		43,740

The above would furnish enough nutrients for a man at moderate work for 12 days. * * We waste at the store, at the market and in the house enough to make us wealthy if we would only save. The fathers and mothers do not understand the little arts of economy and the sons and daughters do not learn them, and we are somewhat inclined to think it beneath our dignity as free-born and well-to-do American citizens to devote our attention to them. We endeavor to make our diet suit our palate by paying high prices in the market rather than by skillfully cooking and tastefully serving at home. We buy more than we need; and, what makes the matter worse, it is frequently those who most need to save that are most wasteful.

The remedy for the evil, so far as it applies to the chief item of our living expenses—our food—must be sought in two ways—in an understanding of the elementary facts regarding food and nutrition and the acceptance of the doctrine that economy is not only respectable, but honorable. And it was in the hope of helping to a better understanding of the subject of nutrition and to show how some of the principal facts may be put to practical application that I prepared this paper.

The Sutro Tunnel Troubles.

By the recent decision of Judge Hawley of the United States Circuit Court for Nevada, the long litigation growing out of the reorganization of the old Sutro Tunnel Company has been ended and the plans of the reorganizers have been upheld. By the decision the complainants get nothing, while the defendants are dismissed with their costs.

The record of the transactions which led to the litigation is an interesting chapter in the mining history of California and Nevada. Along in 1865 and 1866 Adolph Sutro of this city secured from the State of Nevada and from the United States a right of way and authorization for the construction of a mining, draining and exploring tunnel to the Comstock lode, in the State of Nevada. In November, 1869, the Sutro Tunnel Company, a corporation for the purpose of carrying on this work, was formed with a capital stock of \$20,000,000, divided into 2,000,000 shares of \$10. All of the stock was disposed of, and in earlier years it was by no means a drug on the market.

In January, 1877, the company executed a mortgage to Hugh McCalmont and others, all Scottish capitalists. This mortgage was increased by further advances and by accrued interest, until, in 1886, there was \$1,600,000 due on the mortgage, and steps were taken to foreclose the same, William Johns being appointed receiver.

While the suit in foreclosure was in progress some of the shareholders, seeking to avoid a foreclosure wherein all would be lost, began overtures through Theodore Sutro of New York for a settlement of the mortgage. An offer was finally received from the McCalmonts agreeing to take \$800,000 for their mortgage on January 1, 1888. Notices were sent out to all stockholders asking that 50 cents per share be sent in to pay off the mortgage. Some responded, but when the time arrived which was fixed in the offer not half of the \$800,000 had been secured. A syndicate was formed in New York and an extension of time secured from the Scotch capitalists. Other notices were sent out and more money received. About \$550,000 was collected from the stockholders. The syndicate put up the required \$250,000 additional, and the mortgage was purchased in the name of the Union Trust Company of New York.

Other notices were sent to the stockholders and all were allowed to come into the company who desired to do so. About four-fifths of the stock came in. The Comstock Tunnel Company was then formed, and the property transferred to it by the Union Trust Company. Stock in the new company was issued to the holders of the old stock who had come into the reorganization scheme and helped to pay the mortgage, share for share.

Of those who remained outside were Joseph Aron of Paris, a member of the London, Paris and American Banking Company, and Frank J. Symmes of Thomas Day & Co. The former owned about 90,000 shares and had gone into the reorganization with about 50,000 shares; the latter owned about 90,000 shares and was in on the new deal with 40,000 shares.

In December, 1889, the suit just decided was begun by Mr. Symmes and others to set aside all previous transactions on the ground of fraud alleged to have been committed by the defendants, who were, besides the Union Trust Company, the Sutro Tunnel Company, the Comstock Tunnel Company, and the members of the New York syndicate heretofore referred to. Testimony was taken in New York and San Francisco. The bulk of testimony was submitted to the court at Carson, Nev., in February, 1893. At the time arguments were made by H. E. Houghton and R. L. Gear for the complainants and by W. M. Pierson and Edmund Tausky for the defense. The argument lasted eleven days, and at its close the Court took the case under advisement.

For 13 months a decision was awaited. It was rendered on the 5th inst. By it the defense was upheld in all its points, one of which was that the complainants having come into the reorganization scheme with part of the stock they represented, could not afterward cry fraud.

THE Redding *Free Press* combats the prevalent opinion that the surface placers have been cleaned up throughout California. It says the worn-out placers of Shasta and neighboring mining counties will afford a living to many men. Especially in the rainy season is this so. He is a poor man, indeed, who cannot make a dollar or a half-dollar with pan, pick and rocker, and a man in the mines can live on \$15 per month. Last week an old pioneer miner picked up a nugget weighing \$515 or more, and nuggets of greater or less value will be discovered, to say nothing of the fine gold, from time to time, as long as Shasta county exists. Even now many old miners, too feeble to do a week's actual work in a month, are making a living from our placers, and a young man with push, who is not afraid to work, could do much better.

Scientific Progress.

Edison's Kinetograph.

A press dispatch from New York says that Thomas A. Edison has consented to tell exactly what he has accomplished in reproducing the motions of an object by photography. This is the first direct announcement that the kinetograph, as the new photographic apparatus is called, has proven successful.

Everybody has seen nickel-in-the-slot machines which contain phonographs and play any kind of a tune previously sung into them. Mr. Edison has now ready for the market a similar machine containing his moving pictures, which are set agoing when a nickel is put into the slot. This machine he calls a kinetoscope. The kinetograph is the machine which takes photographs, and the kinetoscope the machine which displays them to the eye.

The kinetoscope shown by Mr. Edison in his workshop contains a picture of a five-cent harper shop. The Lilliputian figures of course portray the actions of a scene taken from life. Mr. Edison said:

"Some time ago it occurred to me that it might be possible to invent something that would do for the eye what the phonograph does for the ear, an instrument in fact that would faithfully record and reproduce practically all motions. I was familiar with the zoetrope, an instrument on which certain pictures were painted and which seemed to give the figures a sort of motion, and I was also very much interested in the experiments of Maybridge, who photographed horses in motion by instantaneous photography and reproduced the movements. But all these were very crude and resulted in jerky motions. The eyes are too quick for such photographs.

"I saw that to produce pure motion pictures must be taken with sufficient rapidity to record movements of less than an inch in any part of the body, a longer movement than that producing a jar which destroyed the illusion. Then began a series of experiments in photographing moving objects, and we got our apparatus to take twenty-five different photographs in a second. But this was not sufficient. I found that the human retina was capable of taking about forty-five or forty-six photographs and communicating them to the brain. The difficulty was to give sufficient exposure even for the instantaneous photographic apparatus.

"I found that if a plate were exposed a sixtieth part of a second to a scene that was very light, with a very dark background, a perfect photograph resulted. It was but a simple process then to figure out how fast a machine would have to run between exposures to give forty-six pictures each a sixtieth part of a second exposure. I figured that it would have to move from one exposure to another in 1-185th of a second. That is to say, the instrument must be standing still for exposure three-fourths of the second and must be racing along at an enormous rate of speed the rest of the second so as to get the whole forty-six plates properly placed for exposure.

"If one picture is a thousandth part of an inch out of the exact lines of the preceding picture the sensitive eye instantly notices a tremor of the picture which instantly destroys the illusion. The various devices for properly displaying moving scenes are of secondary importance.

"This has been largely a work of sentiment on my part. I do not believe there is much money in it, but I believe it is of interest to science and history. A great man will never die if his pictures and speeches are saved by the kinetograph and phonograph."

The average weight of 20,000 men and women weighed at Boston was: Men, 141½ pounds; women, 124½ pounds.

The Discovery of the Glacial Epoch.

It is a little more than 50 years ago that one of the most potent agents in modifying the surface features of our country was first recognized. Before 1840, when Agassiz accompanied Buckland to Scotland, the Lake district and Wales, discovering everywhere the same indications of the former presence of glaciers as they are to be found so abundantly in Switzerland, no geologist had conceived the possibility of a recent glacial epoch in the temperate portion of the northern hemisphere. From that year, however, a new science came into existence, and it was recognized that only by a careful study of existing glaciers, of the nature of the work they now do, and of the indications of the work they have done in past ages, could we explain many curious phenomena that had hitherto been vaguely regarded as indications of diluvial agency.

One of the first fruits of the new science was the conversion of the author of Reliquiæ Diluvianæ—Dr. Buckland—who, having studied the work of glaciers in Switzerland in company with Agassiz, became convinced that numerous phenomena he had observed in this country could only be due to the very same causes. In November, 1840, he read a paper before the Geological Society on the Evidences of Glaciers in Scotland and the North of England, and from that time to the present the study of glaciers and of their work has been systematically pursued with a large amount of success.—From the Ice Age and Its Work, by Alfred R. Wallace, in Popular Science Monthly for March.

Epilepsy and Errors of Refraction.

Mr. Work Dodd has discovered a strange relation between errors of refraction and epilepsy. The former, given a certain condition of instability of the nervous system, may excite the latter. In other words, the relation that errors of refraction and epilepsy hold toward each other is that of cause and effect. This is a most useful argument to be used in most cases where people are either too thoughtless or too indolent to have their visual refraction corrected when necessary. Mr. Dodd points out, in addition to the foregoing, that the correction of the errors of refraction will, in combination with other treatment, in many cases cure or relieve the epileptic condition, and that, although in some cases, when the refraction error has been corrected, the epilepsy will continue, it will only be in a modified form, in consequence of other irritation, even though the error of refraction may have been the exciting cause of the fits in the first instance. Mr. Dodd is strongly of opinion that in every case of epilepsy the eyes should be carefully examined, with a view of correcting any error of refraction that may exist by the use of proper spectacles.

Carbonic Acid in Air.

A paper on the value of determinations of the proportion of carbonic acid in air as a measure of the efficiency of ventilation has been contributed to the Journal of the American Chemical Society by Mr. E. H. Richards, who states that for the past nine years the Laboratory of Sanitary Chemistry at the Massachusetts Institute of Technology has had exceptional opportunities for investigating this subject, because the Walker building is mechanically ventilated under the direction of an expert, and is fully controlled by the engineer, who has records for all these years of the quantity and temperature of the air supplied to each room, and of the temperature of these rooms taken four times every day. During these nine years some 5000 determinations of the carbonic acid have been made in these rooms by 200 students. Many problems arising out of these circumstances have been studied and reported upon, but the net gain of knowledge appears to be meager. The outer air surrounding the Institute shows an ordinary

proportion of from 3.7 to 4.2 parts of carbonic acid in 10,000 parts of air. The air in the empty rooms shows a rise of carbonic acid of about 0.5 part, due to decomposition of the organic matter present in the flues, the floors and the walls. The air of the building in general, of the halls, reading rooms, etc., which are open, and in which people are constantly moving about, is maintained at about five parts as an average of all tests for eight years. The air of most of the lecture rooms has contained from 6 to 8 parts, rising to 10 or 12 parts for the large and more crowded rooms, according to the state of the weather outside. From this experience it would appear that students can work well in a clean room with about seven parts in 10,000 of carbonic acid. Much more than this causes dullness, and anything over 13 parts is an almost insuperable obstacle to the full acquisition of knowledge by the classes.

The cave animals of North America, according to Prof. A. S. Packard of Brown University, comprise 172 species of blind creatures, nearly all of which are mostly white in color.

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Mechanical Progress.

New System for Flying Machine.

At a meeting of the Austrian Society of Engineers and Architects, held November 18, 1893, Prof. George Wellner, of the Technical High School at Brünn, laid before a crowded and enthusiastic audience the first publication of his proposed system of aerial navigation—a system which he claims to be absolutely new, says the *Engineering Magazine*. The principle which Prof. Wellner proposes to employ is perhaps most briefly expressed in the magnificent compound name which he himself has conferred upon the proposed machine—"Segel-radflug-maschine"—which in English we can hardly render more concisely than by the expression "flying machine with paddle-wheel sails." To use the inventor's words, his machine is neither more nor less than a mechanical reproduction of the mechanism of a bird's wing, albeit the professor claims, in some respects, to imitate rather the insect than the bird, and especially in this, that many insects can and do readily remain fixed in a given position in the air, whereas birds can accomplish this only by an excessive expenditure of work.

Prof. Wellner raises and propels his flying-machine by means of the rotation of large wheels. The axes of these wheels, like those of screw propellers, are either coincident or parallel with that of the vessel and the direction of its forward motion, and in the matter of propulsion the action of the wheels is similar to that of a propeller; but in respect to the raising of a machine and keeping it suspended in the air, they differ radically in their action from the screw, and resemble rather the paddle-wheel, with movable floats, for here the floats are so arranged, by means of eccentrics and eccentric rods, that when at the uppermost and lowermost points of a revolution they are so inclined that the vertical component of their pressure forces the air downward and the machine upward (*vice versa*, of course, when their action is reversed); and when their arms are in the horizontal position, the floats exert no tendency to raise or lower the machine. Propulsion is provided for by so inclining the webs used for bracing the floats that they act as elements in the blade of a screw, and thus drive the machine forward.

Drawings were presented, showing a "twin-screw" application of the device. A machine designed to carry from four to eight persons has two wheels (or more properly cylinders) 21 feet in diameter and 63 feet long, and between and below these is suspended a cigar-shaped car 8 feet in diameter and 40 feet long, carrying the motors, the passengers, etc. Each wheel or cylinder has arms or spokes, arranged in eight radial planes and carrying as many floats. The arms, like the axles, are of steel tubing. Steering is accomplished by means of four rudders, which, by being placed at right angles to the path of the vessel, may, the inventor claims, be used to hold the machine steady, without motion forward or backward.

Such a machine, at 135 revolutions per minute, would exert 30 horse power, would lift 14,000 pounds and would be capable of traveling from 45 to 90 miles per hour. A machine for two persons would require from 30 to 40 horse power and would cost from \$8,000 to \$12,000.

A small model, with but one wheel and worked by hand, was exhibited, and was run backward so as to exert a downward pressure in addition to its weight, and this pressure was measured by weighing it upon a scale. The current of air through the machine, downward when the machine was run in the normal direction, and *vice versa*, was illustrated by the convenient means of tobacco smoke.

So enthusiastic were the members present that a resolution was unanimously adopted,

requesting the board of directors to suggest ways and means for carrying on these experiments; and at the meeting of December 30th it was announced that a fund of \$800 had been subscribed and placed at the disposal of a committee appointed to prosecute the work.

The inventor says "these are not empty phantoms—not hazy picturings of the desires or airy machinations—that I am pursuing. I stand upon solid ground. I move forward, step by step, upon a mechanically constructive basis. My whole nature revolts from the fantastic."

The Sand Blast in Glass Making.

It is stated that the sand blast was first used in the glass trade about 20 years ago by Mr. Tilghman, an engineer of Philadelphia, who observed that the surface of glass exposed to a stream of sand thrown against it by an air current in a few minutes becomes perfectly dull. He at once constructed a rotating bellows for producing the air current, which was conducted through a perpendicular tube, at the upper end of which the sand was brought into contact with the current. The glass was held over the mouth of the tube at a distance of about an inch, and not more than 20 or 30 seconds were required to dull the surface. In cases where designs or ornamentations had been put on the glass with some elastic substance, as rubber, thick oil paint or papier mache, the sand attacked only the uncovered portions, so that it became possible to produce dull ornaments on a bright background, or vice versa.

Tilghman had his invention patented, and since the expiration of his patent the sand-blowing machine has undergone considerable improvements, and is now constructed in different sizes to accommodate any class of customers. Sand-blowing machines are used principally for dulling and ornamenting all kinds of hollow and plate glass; also for polishing metal castings and cleaning plates, previous to gilding or silvering them, and for engraving wood, metal or stone. The simplest way of protecting that portion of the surface to remain untouched by the sand is to cut the designs out of strong paper and paste them on with glue, which, however, must be carefully done to avoid the formation of blasts. A more rational method is to cut the patterns out of sheet metal, which is especially advisable by plate glass. This method possesses the further advantage that such designs may be used repeatedly, for which purpose they should be covered with a protecting coat, for instance of oil paint, which must be renewed several times.

Heating with Exhaust Steam.

The economy of using exhaust steam to heat offices and factories and to warm drying apparatus in paper mills and elsewhere, has long been recognized; but it is not yet understood as fully as might be that even with exhaust steam there is apt to be a considerable loss through "hack pressure." It is easy to see, for instance, that if a boiler carries 80 pounds of steam, and the cylinder pressure is 40, and it takes five pounds to overcome the resistance offered by the pipes of the heating system, one-eighth of the effective force of the plant is wasted, and this is equivalent to throwing away so much coal, says the *New York Tribune*.

To overcome the back pressure, and hence to reduce the cost of heating and drying, Andrew G. Paul, of Boston, some time ago invented and patented the idea of exhausting the air from the circulatory system. The special device which he has begun to introduce is an ejector, but his claims cover any other method of creating a vacuum independently. The idea is attracting a good deal of attention in New England and elsewhere.

In 1890 the railroads of the world were estimated at 370,281 miles.

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Table of Contents.

The following brief abstract of the contents will give an idea of the branches of the subject treated:
General Plan; Discussion of the Principles of Hydraulics; Rules Deduced from Formulae Obtained; Examples and Calculations; Extensive Tables for Ready Reference; Fundamental Laws of Hydraulics Demonstrated and Expressed in Formula and Rules; Flow of Water through Openings; Weir Coefficients; Triangular Weirs; Flow of Water over Quadrant Weir (tabulated); Application of Tables; Submerged Orifices; Flow through Orifices in Thin Partitions; Tables and Applications; Minors' Inlets; Tables and Calculations; Flow of Water through Short Tubes and Compound Tubes; Flow of Water through Pipes; Tables of Velocities and Cubic Feet Flows for Given Fall per Mile and Diameter of Pipe; Coefficient for Bend-Circular and Angular; Flow through Nozzles; Inverted Siphons; Flow of Water in Open Channels; Extensive Tables; Rough and Ready Notes; Hints for Speedy and Approximate Estimation, etc.

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Useful Information.

Spectacles and Eyesight.

The proportion of people who wear spectacles is constantly increasing. Is this a thing to be lamented? In other words, does it indicate a deterioration of eyesight under modern conditions of life? Those who may be supposed to be best qualified to answer these questions answer them without hesitation in the negative. More spectacles are worn, not because poor vision is more common, but because the eye has been more intelligently studied.

A recent writer in the *Atlantic Monthly* says it is the exception to find persons whose eyes are normal and perfect. At an annual meeting of the British Medical Association, not long ago, the president of the ophthalmological section expressed the hope that the time will come when "a man who goes about with his eyes naked will be so rare that the sight of him will almost raise a blush."

This is as much as to say that since almost every man's sight needs correction, it will be a sign of advancing knowledge when almost every man wears spectacles. Of the advance already made in this direction the *Atlantic Monthly* writer says:

"The methods of testing the defects of vision have, in the last two decades, been brought to a standard of accuracy and refinement previously unknown. Thus many troubles, disabilities and maladies hitherto suffered in patience, or treated incorrectly and in vain, are now traced to defects of vision, and are quickly remedied by the use of appropriate glasses, concave, convex, cylindrical or prismatic.

"The schoolboy's headache, the seamstress's browache, the convergent squint of childhood, so far as they are the results of faulty refraction, are beginning to be erased from the catalogue of human woes."

Some specialists go so far as to maintain that every child should have his vision tested by a competent oculist. "It is far better," says the *Atlantic* writer already quoted, "to discover visual defects and to remedy them at the beginning of school life than to have the child sent home after his sight has been seriously injured, as dull of vision, or unable to get through his studies, and the subject of periodical 'hilarious headaches'—matters nowadays of constant occurrence."—*Yonth's Companion*.

How to Sleep Well.

In sleeping much depends on securing a comfortable position. Lying on the back would seem to give the most ease, but general experience and practice prove that it does not, and it is liable to some definite objections, says a writer in the *Jenness Miller Monthly*. In a weakly state of the heart and blood vessels, and in certain morbid conditions of the brain, the blood seems to gravitate to the back of the head, and to produce troublesome dreams. Persons who have contracted chests, and who have had plenrisy and retain adhesions of the lungs, do not sleep well on the back. Nearly all who are inclined to snore do so in that position.

For these and other reasons it is, therefore, better to lie on the side, and in lung disease to lie on the weak side, so as to leave the healthy lung free to expand. It is well to choose the right side, because, when the body is thus placed, the food gravitates more easily out of the stomach into the intestines.

Sleeping with the arm thrown over the head is to be deprecated; but this position is often assumed during sleep, because circulation is then free in the extremities and the head and neck, and the muscles in the chest are drawn up and fixed by the shoulders, and thus expansion of the thorax is easy. The chief objections to this position are that it creates a tendency to cramp and cold in

the arms, and sometimes seems to cause headaches and dreams.

The best sleep is obtained when the shutters are closed so as to make the room dark, and the windows are adjusted so as to admit plenty of fresh air. Early rising is not a virtue unless the riser has secured sleep enough, and the best rising is obtained when the sleeper wakes naturally.

Increasing the Height of a Chimney While in Use.

A remarkable feat has been recently accomplished at the Bonsecours Spinning Works at Nancy, says *Industries and Iron*, namely, increasing the height of a chimney about 100 feet high by about 30 feet, without stopping the works for a single day. Owing to the power being increased, the existing chimney did not give sufficient draft for the increased number of boilers, and one or two alterations had to be faced—either to build a new chimney alongside the old one, or to increase the height of the latter. Augustus Bartling of Bernburg, Anhalt, offered to increase the height of the old chimney without interfering with the work of the mills. Aided by another man, whose agility and nerve were equal to his own, Mr. Bartling fixed a series of light steel ladders to the chimney by means of iron hooks driven in between the courses of the bricks, erected a pulley at the top of the chimney and a flight of scaffolding all around, and then having lowered the cornice surmounting the chimney, they built on to the top at the rate of about four to five feet per day. The whole work occupied eight days, and was perfectly successful. While this is the first chimney dealt with in this manner in France, Mr. Bartling states that he has carried out similar operations in Germany.

Testing Lubricating Oil.

For testing the viscosity of lubricating oil, the following apparatus is in use on the Philadelphia & Reading railroad: A cylinder $2\frac{1}{2}$ inches long is suspended in the oil to be tested, by means of a fine steel wire attached to its upper end to a knob inserted in a stiff frame. By twisting this knob the middle of its length the wire has attached to it a horizontal disc, graduated in degrees, which rotates with the wire when the latter is turned, and serves to measure the angles of the oscillation. In making a test the oil is surrounded by a bath of water or paraffine to bring it to the required temperature. The disc on the wire is clamped, and the knob at the top turned through an angle of 360 degrees. The clamp holding the disc is then released, and the torsion in the wire causes the cylinder immersed in the oil to move through angles which become less at each succeeding oscillation. These angles are measured by the disc, and form a criterion of the viscosity of the oil.

Durol.

"Durol," the new hardening composition for steel, has, we are informed, says *Invention* of London, been tested and approved by the largest iron works, steel manufacturers, mechanical engineers, etc., on the continent, and most astonishing results have, it is said, been obtained, whereby "Durol" has been pronounced to stand quite alone amongst all "hardeners." "Durol" is, accordingly, of great importance to the steel industry. Steel manufactured with "Durol" obtains, we are told, the hardness of a diamond whilst retaining its tenacity and temper.

Overcoming Quicksand.

In some recent sewerage work at Boston the foundation for a length of brick sewer proved to be a quicksand, which boiled up into the trench when it was attempted to excavate it. The difficulty was overcome by driving a line of tube wells along the side

of the trench into the quicksand at a distance of about eight feet apart. On connecting these wells with a pump, it was found possible to bring the water under control, and to drain the sand through which the excavation had to be made.

A splendid record for safety of ships and cargoes was made during 1893 by the large fleet of grain carriers between Pacific ports and Europe. The voyage is the longest and stormiest of all routes in the world's commerce, yet out of 326 vessels which sailed from San Francisco and other Pacific ports for Europe, only one failed to arrive at her destination safely and with cargo in good order. This one ship was stranded on a South Pacific island, and lack of wrecking facilities alone prevented her getting off and resuming her voyage. Her crew was saved.

Electricity.

To Prevent Collisions.

A Cincinnati inventor, Dr. Von Dolcke, has devised a plan for the prevention of collisions on railroads in which electric storage batteries play the principal part, says *Electricity*. The complete details have not yet been published, as the patents for the device have not been secured yet, but an outline of the plan is as follows: The entire road is to be divided into sections of 500 feet to a half mile each. Wires are to be connected with the flange of the rail at certain points from telegraph poles that stand along the road. In this way the inventor proposes that every road that wants to prevent collisions shall fix their tracks. Every engine on the road is to be provided with a storage battery. When one engine is on the track the circuit is open, but if a following or approaching train comes within the 500 feet or half mile section, the circuit for each battery is closed, and the result is that a torpedo on each cab explodes and warns the engineer of danger. If by any chance the engineer is sleepy and does not hear the discharge, the battery, in a limited time, works a wire that reverses the lever and stops the train. As an earnest of what the invention will do, it is proposed to start two engines headed toward each other, and let them try to approach. Dr. Von Dolcke says they will come to a standstill before any damage is done. He says experienced railroad men have told him that a train going 40 miles an hour can be stopped in 300 feet, and he proposes to be safe and put the limit at 500 or perhaps a half mile. Some of the details of his invention the doctor would not give out, but he says he will explain everything when his papers arrive.

Dress Ruined by Electricity.

It is not often that you hear of a dress being ruined by electricity, yet such an accident really occurred at the Alvin Theater Tuesday night, says a writer in the *Pittsburg Dispatch*. In one act Miss Robinson wears a handsome gown, which is trimmed around the bottom and the waist with a sort of metallic embroidery. On Monday night, when she answered her cue by coming out of the house which is in the setting, she noticed a bright flash of light just as she stepped out of the door before the audience. She thought nothing of it, attributing the flash to the stage hands making some electric connection back in the wings. On Tuesday night, at the same part of the play, Miss Robinson was walking slowly to the door awaiting her cue, when she again saw the flash, and, looking down, found herself enveloped in a ring of fire around the bottom of her skirt. She had no time to call for assistance, but, hearing her cue, stepped upon the stage, delighted to find the fire did not follow her. After the act was over she examined her dress and found that it was ruined, the metallic trimming around the skirt having melted entirely off. The cause

of the strange accident was soon found. The metallic embroidery had come in contact with one of the electric sockets in the floor from which current is obtained to light the bunch lights. A circuit being found, the continuous trimming made a sort of arc. Had there been any metallic connection with the copious trimming of the same kind upon the waist, the accident might have cost the actress her life.

Lighting the Nation's Capitol.

It is probable that the electric-lighting plant to be put in the nation's Capitol will not only be required to light that building, but also to illuminate the Congressional library, which is to be the largest building of its kind in the world, and which, by reason of its uses, will require the best class of illumination.

To accommodate such a plant it will be necessary to locate the engine and dynamos in a structure erected for this special purpose. The location of the power-house is now being carefully considered, and the decision will probably be reached very soon. The house will be ornamental in appearance and will be of sufficient size to contain not only the eight dynamos necessary for the present, but also for other buildings that may be added to the group clustering around the Capitol, notably the home for the Supreme Court.

A careful estimate has placed the original cost of the building, the machinery, the wiring and general installation of the plant at \$200,000. This will insure the work to be of the best character and the plant to be of sufficient size to furnish all the light that can be used in the buildings and the grounds. The latter is a most important item in the calculations, for at present there is an utterly inadequate illumination of the great park. It is not certain whether the grounds will be lighted by arc lamps or groups of incandescent globes. But this is a matter of detail to be settled afterward.

A rough estimate that has already been made of the cost of maintaining the new plant, which will do not only the work now done by the gas and electric plants in the Capitol building, but also the entire work of lighting the new library building and the Malby House, shows that it will cost in the neighborhood of \$19,000.

An Electro-Oxy-Hydrogen Blow-Pipe.

H. N. Warren, in the *Chemical News* for January 19, 1894, describes a new form of oxy-hydrogen blow-pipe in which the gases are obtained directly from the electric decomposition of water. The water is decomposed in a U-tube, as in the familiar laboratory experiment, and the gases rise directly into the blow-pipe, where they mix. Thus the action is perfectly automatic and of almost indefinite duration; no taps are required, the gases are in the exact proportions required by theory, and the flame may be regulated by increasing or decreasing the decomposing electric current.

Cables of the World.

According to latest reports, there are in the world 104,344 miles of sub-marine telegraph cable. Of this total the various governments own 14,480 miles of cable and 21,560 of wire; the balance is owned by private companies. Where the telephone wires are overlaid, the speed of transmission is at the rate of 16,000 miles a second; where the wires are through cables under the sea, the speed is not more than 6020 miles a second.

A French Electric Carriage.

A French carriage which carries six persons is driven by an electric motor receiving current from a battery of 54 Dujardin accumulators, and has a total weight of about a ton and a third. One charge of the accumulators suffices for a trip of 44 miles at a speed of ten miles an hour.

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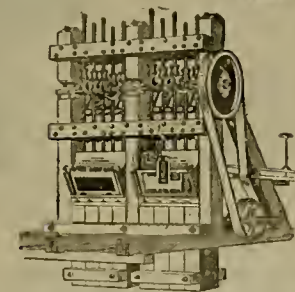
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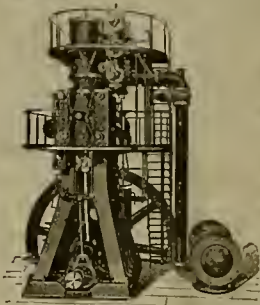
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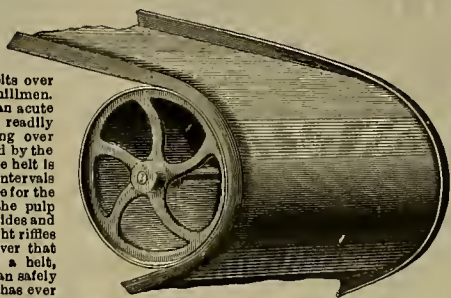
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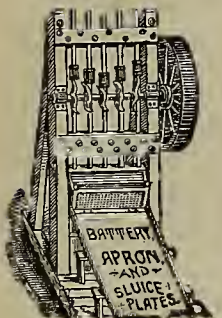
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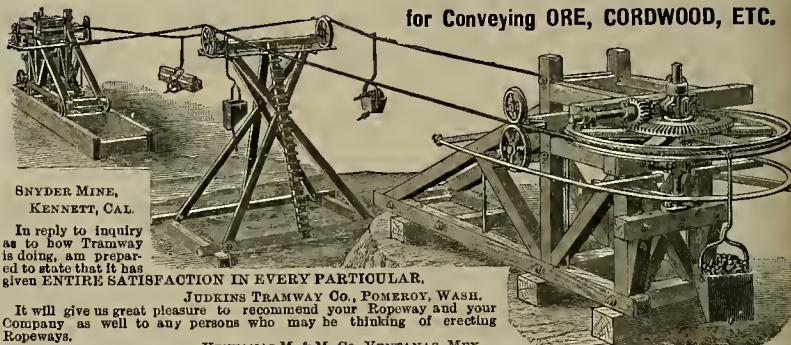
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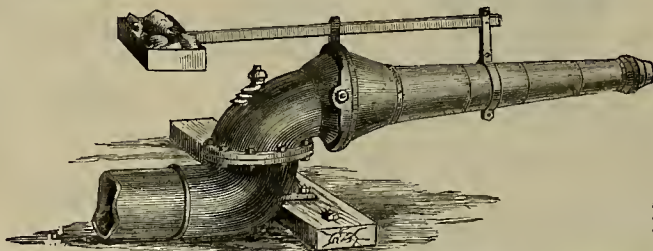
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Mining Summary.

The following is mostly condensed from journals published in the interior, in proximity to the mines mentioned.

CALIFORNIA.

Amador.

Closed Down.—*Calaveras Citizen*: On Saturday last the Sheep Ranch mine closed down, after a most unparalleled record of about 25 years. The whistle that has blown the signal of work shifts so faithfully for years blew its last blast, perhaps forever, long, sad and sorrowful, until the steam in the boilers no longer gave detonation through the whistle pipe. The mine that so many years had given life to the town had closed. The occasion was one of the most solemn, and tears came to eyes that told the tale of "be it ever so humble, there is no place like home." The town has as its residents some who have grown from the cradle to manhood and womanhood who will now be cast out from their surroundings to seek for fortune elsewhere on the broad land. Saturday night a ball was given by the people of the town, trying to make merry and while away the solitude that would ever and anon present itself to the grave and thoughtful mind. The attendance was quite large and many grown gray in the village turned out to join in the farewell dance of the dear old town.

Extending Tunnels.—*Amador Ledger*, March 9: At the Albany, the Astoria tunnels leading from the crosscut north and south are being extended on vein matter, the face of same carrying stringers of quartz which give low assays. The Farrell people are still extending their tunnel into the ore body. Their mill is still closed down, but they expect to resume crushing as soon as Messrs. Wise and Seligman return from Oakland.

The nine tributaries who have the Amador Queen No. 2 leased have their ore bin full of ore, and are repairing one battery of the mill and expect to commence crushing in a short time.

The north drift of the 800-foot level in the Hardenburg is being advanced. As the chutes of ore so far encountered are very short, the company is living in hopes that more extensive bodies will be found as they advance north, as there are several hundred feet of virgin ground yet unexplored.

Satter Creek has taken on a busy appearance once more. Both the Wildman mill and the Hector mill have been running for a week or more. About 200 tons of ore were run through the Hector mill by the men who are working the property upon the tribute plan. They stopped Tuesday to make a clean-up, and if the result thereof is satisfactory, will continue to take out quartz.

Five tons of quartz have been shipped to the Midwinter Fair from the Bay State mine and placed on exhibition in the form of a pyramid. A new contract for sinking the shaft 115 feet deeper has been awarded to the same parties, who have just completed the 100-foot contract. This sinking will bring the shaft down to 500 feet with a 40-foot stump. The favorable ground still holds out, and the contractors are making good progress.

Butte.

New Air Compressors.—*Forbestown News*: The new air compressors at the Gold Bank mine have been in working order for the past ten days. Everything about the machinery works to a charm, and two Barleigh drills are driven by it, and more will be placed in operation in the near future. This new machinery will give this mine a chance to keep their development work ahead of their milling capacity.

Calaveras.

Proving Its Richness.—*Prospect*: The old Gold Hill mine at Smith's Flat, which for many years proved a bonanza to its owners, the Osborns, is again proving its richness after some time of unproductiveness. The mine passed into the hands of a Chicago company a few years ago and has been pretty poorly managed by them so far as getting gold out of the ground is concerned. It appears that the company has become much discouraged, and openly charged that the mine had been misrepresented, and even that it had been "salted" for their benefit. Of course the reputation of the mine was too well established here for such charges to have any effect, but it seems that Wm. Osborn recently told the management that if they would let him have charge of the mine for a short time he would prove all that had been claimed for it. He accordingly was put to work, with the result that some time the first of last week he took out \$600 in one day, and on Wednesday of that week \$1500 more. In all, nearly \$3000 was taken out during the week.

El Dorado.

The Stillwagon.—*To the Editor*:—The Stillwagon Mining and Milling Company—a corporation in Sacramento—has bonded the well-known Stillwagon mine, situated about six miles from Grizzly Flats. The company has placed the ditch in first-class repair and has erected a modern five-stamp mill with concentrator; also an air compressor of sufficient capacity to run two power drills. Blacksmith shop and boarding-house all complete are on the property. The lead is small, but the rock is rich. Two tunnels penetrate the mountain from the south side. The ledge is in eight all the way, and varies in thickness from two inches to two feet. The lower tunnel is in about 400 feet, and exposes a chute of ore extending some 50 feet along the vein. The rock is good, the lowest assay being \$125 per ton. At the present writing, two shifts are at work in stoping. A small Rand drill is used. Formation is granite, but the fissure shows no sign of pinching out. It is the purpose of the com-

pany to thoroughly prospect the hill during the present season. An Ingersoll-Sergeant machine will be used in the head of the tunnel. It takes something like 150 inches of water to run the six-foot Knight compressor wheel and 100 inches to run the four-foot mill wheel. The fall of water is 73 feet. The superintendent is W. S. Weymouth, formerly superintendent of the South Cosmopolitan Company; president, Jos. H. Gray; secretary, Geo. C. Holbrook. Sacramento, March 10, 1894. H.

Kern.

Deposits of Colemanite.—*Bakersfield Californian*: Parties prospecting near Colorado camp, in the Red Rock range, have recently found quite extensive deposits of "colemanite" or "cotton balls," and have made quite a number of locations. Not far from this locality Searles Bros. & Killings found some deposits of colemanite several years ago, but they were not extensive and were speedily worked out. Colemanite is a variety of boracic acid and occurs in nodules. Its cottony appearance is due to efflorescence of the outer surface. Combined with two parts of soda ash it makes the borax of commerce, which is a bi-borate of soda.

Nevada.

On a Paying Basis.—*Union*: That the Orleans mine will develop into one of the best paying mines in this district is a certainty. Acting Superintendent Brockington informs the *Union* reporter that five stamps of the Empire mill are constantly working on ore from the Orleans. The rock pays over \$25 a ton, which is very satisfactory indeed. The mine is paying its own way, and should the company feel disposed after this month's clean-up, they could declare a dividend. This will not be done, however, for the reason that the money will be expended in building a five-stamp mill—to which five stamps will be added as soon as they are found necessary. The Powling, or main chute, is now being worked.

Mine Sold.—*Telegraph*: The Normandy mine, owned by Messrs. Senechal and Richards and located on Deadman's Flat, has been sold to the Gold Trust and Development Company of which Dr. Stephen H. Emmens, the eminent chemist and lecturer, is the head. There has been but little work done on the Normandy mine, but there is a good-sized gold-bearing ledge in the shaft, and there has been a great amount of gold taken from the surface surrounding the ledge. The company that has bought the claim has simple means and is going to work it immediately. Mr. Frank DuMaine will have full charge of the affairs at the mine, and he informs us that very extensive hoisting and pumping machinery will be erected just as soon as the lumber and other necessary machinery can be placed on the ground. Mr. DuMaine will give the business his entire attention, and in him the company has secured a faithful and competent man.

Bound to Win.—*Herald*: The San Jose Mining Company will probably have to try another way of getting at their rich gravel deposit on the Washington ridge. They have been working through a vertical shaft about 300 feet deep, and the water comes too fast for them. They are thinking of arranging with the Centennial Company to extend the Centennial tunnel to the San Jose ground, thus draining it. The Centennial tunnel is 2000 feet long now, and would have to be run 5000 feet farther to tap the San Jose. This done, however, the San Jose people could hoist the gravel through a shaft, and not have to pump. The San Jose people have true grit, and have no intention of giving up. They spent over \$10,000 last year, and are willing to spend as much more. They have seen enough of their mine to know that it is worth spending money on, as every car of the gravel pays. If the tunnel project is deemed too big a job, they will probably sink an incline shaft and make it large enough to put in big pumps.

A Bio Crushing.—*Union*: The lessees of the Wisconsin mine are having crushed 76 loads of ore at Joe Southern's mill, and a clean-up will doubtless be made the latter part of this week. The ore, it is expected, will pay as well as former crushings, which have been remunerative.

Good Cleanup.—*Telegraph*: A mighty good cleanup has just been made from ore crushed at Joe Southern's and which came from the Wisconsin mine. The rock was taken out of the north drift at the depth of 225 feet and there were 65 loads of it; the yield was \$53 per load. There now remains upon the dump about 70 loads and they are being hauled to the mill as fast as possible. The mill is kept constantly running on the Wisconsin rock.

Drain Tunnel Completed.—*Transcript*: The drain tunnel upon which work has been going on at the Nevada City mine for some time past has been completed, and the work of opening a station on the 500 level has been commenced. When this is finished the shaft will be sunk another 100 feet. The mine is looking well throughout.

Will Start.—*Telegraph*, March 6: The Granite Hill mine will resume operations to-morrow, and Denver Weggoner has been appointed the superintendent of the mine in place of Stephen Fowler, resigned. Mr. Weggoner will give his undivided attention to the work, and hopes to have the mine, which is now filled with water, running at full blast in a short time. The mine is looking well, and slate has been encountered.

Ten Stamps Needed.—*Telegraph*: The W. Y. O. D. mine is just now looking so good that the management has decided to erect ten stamps more to assist in crushing the ore now coming from the mine. The W. Y. O. D. has all the modern appliances in its mill and when the additional ten stamps begin to drop, look out for big dividends.

The Odin Strike.—*Transcript*: The strike made at the Odin mine a few days ago is of

much more importance than was at first supposed. The gravel has been prospected a distance of 50 feet and found to be rich the entire distance, being remarkably so in spots. It will require about two months work to get the mine in shape for taking out much gravel, and then dividends will soon follow.

Plumas.

Quartz Discovery.—*National Bulletin*: We received recently about 50 pounds of very good looking quartz from the Mountain Chief location on Mill creek, about four miles from Quincy. The owners of this property are Messrs. Kenneth McDonald, Geo. Ellis and Jo. S. Rodgers. The vein was discovered about five years ago, but the fact was kept a secret until three weeks ago, when the vein was discovered on top of the hill through which it runs. The length of the vein from the bed of one ravine to that of the other is about 700 feet, and its altitude above the two streams is nearly 350 feet at the highest point. The owners have been sinking a prospect shaft and are now down 16 feet, the ledge at that depth being between four and five feet, only slightly inclined and between well-defined walls. They claim to have some very rich ore, and that out of 35 pounds of it crushed in a mortar by hand, they secured \$4.50. Of course, this must have been picked rock. However, they claim that all parts of the vein show rich prospects. In the same vicinity, Frank Vere and Mr. Lowe have locations which they think a great deal of.

Riverside.

Good Strike.—*San Bernardino Courier*: Another rich strike has been made in Riverside county, near Salton. P. M. Living came in and brought three large specimens of quartz. The gold is visible to the naked eye, and under gaslight fairly glitters. The mine from which these specimens were taken is known as the Summerville mine. The property has been worked for about two years by the owners, but has never been known to yield very rich ore till a few days since, when a strike of unusual richness was made on the 200-foot level, from which these specimens were taken. The mine is about eight miles north of Salton, on the Southern Pacific, and will doubtless be the making of a fortune to the owners. At present they are working only a few men and have no machinery, but they will continue to develop their interests, and have given out that the property is not for sale. This discovery will probably cause a rush to that vicinity. There is a number of men prospecting in the neighborhood, but no strike of importance outside the present one has been reported.

Good Ore.—The main shaft on Governor Blasdel's Santa Rosa mine, near Perris, is now down 225 feet. A station has been established at that point, and from it a force of men is at work night and day drifting north and south. Between the upper level at 125 feet and the lower level the vein has enlarged from two to over three feet, and an excellent grade of ore is exposed the entire distance.

San Bernardino.

Shadow Mountain.—Of all the mineral-producing districts contiguous to Venderhilt, says the *Star*, none have attracted more attention in mining circles here during the last two months than the Shadow Mountain country. There has been no great excitement connected with it, but instead, its growth in public favor has been steady and gradual. "Shadow Mountain," says a prospector of that section, "is the poor man's country, for the reason that there is rich rock from the grass roots down. The veins are large and the ore rich, and it is bound to be a good place. There are more men coming in every day now, and very few are going out. Everybody is doing well."

Placer Mines.—For some time it has been known by people of this vicinity, says the *Rialto*, San Bernardino county, *Fruit Grower*, that there were some placer mines being worked in Lytle Creek, and that some of them were paying fairly well. The old Turk & Banks mine has been one of the good paying properties. On Tuesday of this week James Washington dropped into our office and showed us some of his fine nuggets as one would wish to look at. He has been working his mine for some three years, and has at no time worked at a loss. Most of the time when at work he has taken out \$3 to the man per day, and this, too, in a very crude way with the old-fashioned rocker and with no modern appliances whatever. Mr. Washington is a colored man, who, as we said, came here three years ago, \$100 in debt, but he don't owe anybody now.

Shasta.

Pounding Good Ore.—*Courier*: Mr. Janney, of the Minnesota mine, on Spring creek, says about ten men are employed at the mine, and the ten-stamp mill is busily pounding away on good ore. The new management has run a 125-foot incline on the mine, and also advanced the tunnel the same distance, and have encountered a body of fine ore.

Siskiyou.

Five Coal.—The Siskiyou coal mine at Windy creek, near Ager, shows some fine coal prospects lately, with steady improvement in the tunnels as the work progresses. At present a ledge of superior coal has been found, measuring over 34 inches in thickness, and fine for blacksmiths' use.

Sierra.

Plenty of Snow.—*Messenger*: It is well worth one's while to take the trip from Downville to Sierra City now. Every ravine and canyon on the south side of the river (opposite the road) has its snowfields, some of which are acres in extent and many feet deep. One in particular that came down Avalanche ravine is a monster. The ravine was not big enough to hold all the snow that slid and the slide divided on a point, part going up the river and part down. The

half that went down has filled up the entire river to a depth of 100 feet, under which the water has eaten its way. This is said to be the biggest snowslide ever known to have come out of a ravine that is famed for big slides. The cabin of the Italians managing the wood tramway was moved from its foundations and part of the Tecumseh flume carried away by another slide.

Stanislaus.

Not Exhausted.—The placers that made the town of La Grange, in this county famous in the early days, have long been supposed to be exhausted, says the *Modesto Herald*, but H. L. Dominici and Eli Leach have found a strip of ground that has heretofore been overlooked and considered valuable only for agricultural purposes. This strip is on the north side of the Tuolumne river and is about a third of a mile long by 150 yards in width, with the bedrock from 15 to 20 feet down. The gentlemen named are mining the deposit by the old-time flume-washing process, and it is related that the surface earth is yielding at the rate of 12 cents to the wheel-barrow load, the pay increasing as depth is attained. In bygone years rich clean-ups were made from the bedrock in this locality.

To Open a Claim.—*Journal*, March 14: Newt, Lamb and Bee Lee are making preparations to open a blue gravel claim farther up the creek than the Austin & Co. claim, and are getting firewood hauled upon the ground with intention of procuring a first-class steam engine from Chicago to hoist gravel and work the pumping machinery in keeping the claim drained of water. They have some machinery already on hand for the purpose.

S. S. Cooley, in hauling away the dirt shoveler from the corner saloon opposite the post-office in Yreka, for a cellar, found two small specimens of gold, and could no doubt find more by washing the ground taken away, although it was not near enough to bedrock to pay rich. The entire townsite of Yreka is located on rich ground, at bedrock, but the patent obtained prevents any mining, except what can be done by owners on their premises without injury to adjoining property. The bedrock ranges from 15 to 30 feet below the surface, and contains such an immense quantity of water as to require powerful steam pumps for draining the same.

From Sawyer's Bar.—*Cor. Journal*, March 14: March came in like an enraged lion with plenty of snow for a good water supply, giving assurance of a splendid season for mining in the Salmon river region.

The Jumbo Company has shut down operations for awhile, and the property is about to change hands.

Golden & Eveleth have resumed work in their quartz mine, having been interrupted by the deep snow.

Monkton & Co. are almost ready to start work again very soon at their mine. Hall & Co. have completed their ditch, with the hydraulic pipe laid, for starting the giants.

The old Black Bear quartz mine has not looked as well in ten years past as at present, a new strike of high-grade ore having lately been found.

Campbell & Wagner had a short run on the old Grattan mine, meeting with good success. They were prevented from further washing by the water freezing, and have since been taking out quartz to be ready. Their prospects are certainly very flattering.

The Red Hill mine, on Know Nothing creek, paid handsomely at the last clean-up, under the able management of P. T. McManus.

Dougherty Bros. are working off pay ground at a great rate, but it is rocky, though paying well.

John Barry and Wm. James have completed their flume and race, and are now busily at work sluicing down rich pay gravel.

Mr. Sallee made a clean-up of \$1100 at his claim.

Hamilton & Henry's mine is lying idle at present, but will soon be started up.

Trinity.

The Quicksilver Mines.—*Dunsmuir News*: The Integral quicksilver mine has been running all winter and a large stream of quicksilver is continually pouring from the mouth of the furnace. This mine has developed into the richest quicksilver mine in the country, and is giving employment to a large force of men. The old Altoona mine, in the same locality, will start up in a few weeks. It is another very rich piece of property and has a whole mountain of ore in sight. This property has been in litigation for years, but that is all settled now and the property will be worked for all it is worth. There will be a large force of men working in that country this summer.

Tuolumne.

In Running Order.—*Independent*, March 10: The Rawhide mine is again in full running order. The vast amount of water that gained access to the Jack Rabbit shaft and levels from old Rawhide shaft and stopes has been reduced sufficiently for active work to be resumed in the levels and stopes. Two steam pumps and skips have been constantly hoisting water for the past several weeks. The miners are now breaking out the usual rich rock and filling up the ore bins, preparatory to starting up the mill on Monday next. The company is preparing to place the water, for power, to run all the machinery, also for pumps, hoist and mill, on the top of Table mountain. The water will be conveyed in large steel pipes to the works. This new and most necessary departure will provide all the power needed for the present and future development of this still wonderfully rich mine. A supply of firewood will be kept always on hand, in case of breakage of ditch, flumes, or pipes. This is a safe precaution, and is a sure auxiliary in case of need.

The Cardinelle.—This once famous mine, from which some \$300,000 was extracted in the

early days of mining at Tuttle town, is now showing unmistakable signs of the near approach to a pocket. Thursday a small vein—a counter—was found striking into the main vein, which is from two to four feet wide. We were shown several samples of rock freely covered with gold, which were found at a point where the rich metallic slate had also come in. This augurs well for a rich development near at hand. The company has been working at considerable cost, and has sunk over 200 feet prospecting. It is in a drift north 109 feet, where the present prospect has been found—the first gold seen since the plucky owners have been so assiduously working for the past 15 months. From this point to the surface there is fully 190 feet of virgin ground. All the necessary crossings and gold seams are being found near this point of contact.

NEVADA.

Washoe District.

SUMMARY OF COMSTOCK OPERATIONS.—In his official report of last week's work in the Consolidated California & Virginia mine Superintendent Lyman says: "1650 level.—No work has been done in the drift run north from the foot of the upraise on the sill floor of this level. From the end of the crosscut running east—68 feet in from the drift run north from the east crosscut No. 1 from the north drift from the winze—down 52 feet—a north drift has been started and advanced 12 feet in a porphyry, clay and quartz formation of low assay value. Have extracted in our workings in the vicinity of the winze—down 20 feet—18 tons of ore assaying \$38.50 per ton. Have shipped to the Morgan mill 517 tons and 120 pounds of ore, the assay value of which, per car sample, was \$38.08 per ton. The assay value, per battery samples, of the ore worked at the mill during the week (610 tons) was \$33.78 per ton. 1000 level.—At a point 353 feet south of the shaft station the upraise has been carried up 30 feet. The sill floor sets of the upraise, as already reported, showed streaks and bunches of ore of fair value. In working upward we passed through the ore into quartz and porphyry assaying from \$2 to \$10 per ton. In the top of the raise openings the formation is porphyry, clay and quartz of some assay value. The east crosscut No. 2, started at a point in the south-west drift at a point 527 feet from the shaft station, or 117 feet north from the Best & Belcher connection, has been advanced 40 feet, passing through porphyry, clay and quartz formation of low assay value."

In the Best & Belcher mine, on the 900 level, the east crosscut on the north boundary has been advanced 18 feet, passing through porphyry and seams of clay; total length, 392 feet. In the Gould & Curry, on the 200 level, west crosscut No. 5 was advanced 14 feet. The face is in porphyry. In the Andes mine, on the 420 level, west crosscut No. 3 is in 70 feet. Formation, clay and porphyry.

In the Ophir mine no changes are reported in the 1465 level workings, except that a new west crosscut has been started from the north drift 142 feet from its mouth, and has been advanced 15 feet in porphyry, clay and quartz. An advance of 84 feet has been made during the week in reopening and repairing the Central tunnel, making the total length of the drift reopened from its mouth 884 feet. Have continued (jointly with the Mexican Company) the work of making repairs to the main shaft. In the Mexican mine, the upraise near the mouth of the west crosscut on the 1465 level has been carried up 23 feet, and continues in porphyry and quartz of some assay value. On the 900 level of the Union shaft the joint Union Con. and Sierra Nevada east crosscut is in 134 feet. The face is in tough clay.

In the Hale & Norcross mine, in working off from the winze below the 1300 level, they extracted the past week seven cars of ore, assaying \$18.21 per ton per car sample. In the Kentucky Consolidated mine, on the 1100 level, the incline raise from the south for an air connection is up 18 feet in quartz of fair grade, with bunches of good ore. 1200 level.—Have started in this level a joint lateral drift with the Yellow Jacket running south in the west ledge; face in good ore of fair grade. In the Alta mine on Wednesday last the raise reached the height of 100 feet, and at that point they started a drift south in the vein. This drift is now in nine feet; face in porphyry, clay and quartz. They are making a connection between winzes No. 1 and No. 2 at the depth of 24 feet, and saving a little ore of fine quality; average value of car samples, \$30 per ton.

In the Sierra Nevada mine the south lateral drift from the intermediate tunnel has been advanced 17 feet; total length, 484 feet; face in hard porphyry. Are putting in a line of pipe from the Union shaft to convey compressed air to the tunnel, which will enable them to use machine drills and make better progress. The joint east crosscut, near the north line from the north drift, 1520 feet west of the shaft, 900 level, has been advanced 22 feet through heavy clay; total length, 134 feet.

CARBONATE OF SODA DEPOSIT.—*Enterprise*, March 8: The vast area of white sand on the plain east of town, which is a familiar object to every resident of the Comstock when viewing the landscape to the eastward and designated as the alkali flat on the desert, and which in certain conditions of the atmosphere resembles a lake in the midst of the vast plain, has recently been located under the mining law in 20-acre sections. There is every evidence that at some remote period this plain was a vast inland sea, the level of which is distinctly marked by a line of marine shells along the range of hills marking its northern and western boundaries. Acting upon this theory, a local prospector, who is as familiar with geology as mineralogy, concluded that the so-called alkali flat, being the lowest point on the plain, was the last place the receding waters of the inland sea occupied before they finally vanished. This

conclusion was natural, as the surrounding country is covered with a thick growth of sagebrush, gradually growing thinner until it reaches the boundaries of the sand flat, on the surface of which there is not a vestige of vegetation of any kind. A shaft sunk in the sand showed a stratum of marine shells and other formations usually found in the bed of lakes and at a depth of six feet a deposit of carbonate of soda was encountered which is of unknown depth, as it still showed in the bottom when the shaft was down to a depth of 12 feet below the surface. Tests were made at various places on the sand flat and all showed that the carbonate deposit extends throughout the entire area, which includes several hundred acres within its boundaries, and demonstrated beyond doubt that the deposit is of vast value. The locator is now negotiating with an Eastern firm for the sale of his ground with a fair prospect of success.

CARSON DREDGE COMPANY.—A meeting of the stockholders of the Carson River Placer Mining and Dredging Company was held in New York City on the second of this month.

The stock of the company was increased to \$2,000,000, and a block of this stock, sufficient to pay all debts and complete the proposed plant, was offered to parties interested at a specified price, the remainder to be reserved until the present plant shall be paying dividends, and then be sold only for putting in more new plants.

The plan of the company is that of concentrating the material raised, and also milling the concentrates, with supplemental arrangements for saving the free material. The company proposes to put in an electric plant to furnish the power, and this, together with the concentrating plant, will require an expenditure of something over \$20,000.

In view of the above facts the Lyon County Times considers that the prospects of the Carson River Placer Mining and Dredging Company never looked better.

J. C. Pierson, now superintendent of the Sacramento Gas Works, will succeed Dr. O. H. Warren as manager of the company, and Captain H. Davis will act as superintendent.

Comet District.

GREAT SILVER MINE.—The acknowledged great silver mine of this section is the Linden, owned by Freudenthal Bros. & Smith, situated in Comet district, 15 miles west of Pioche, says the *Lode*. H. W. Turner and Messrs. Swindler and Lloyd visited the mine during the week, and all express themselves as having seen a great bullion-producer were silver where it should be. The entire work on this property is exclusively in ore that, without assaying, will average \$50 per ton, and a lot of about 30 tons, which has been assayed, will average 20 per cent lead, \$12 gold and upward of 140 ounces silver per ton. The formation is principally lime rock, but the Linden was discovered in a contact of shale and lime, and its discovery is the theory of the district. All the work of the many years past has been on little seams of rich ore and large ledges of low-grade ore, with all the work entirely and exclusively in lime formation. The discovery of the Linden induced the hope to prospect other ledges, and with the knowledge derived from development work on this mine they met with success.

ARIZONA.

BIG BUG CAMP.—Cor. Prescott *Journal-Miner*: Being on a visit to some of the mines in this district, I find the hills are full of prospectors. George Whittaker is extracting \$50 ore from a mine he has leased of Frank Blies and Joe Askew.

Jim Slack, the man who discovered the Yankee Girl (now the Henrietta), has again made a rich strike in the 79, formerly the Lotta. This mine has a shaft 200 feet in depth, with a crosscut tunnel 300 feet in length. The south drift, 150 feet from the top, is in 100 feet on an ore shoot of 2½ feet in width. The ore assays \$140 in gold and 60 ounces in silver per ton. Mr. Slack is working the mine with three men, and is taking out lots of ore which has been milling from \$40 to \$50 per ton, but this strike sends it up into the hundreds. He also has very rich ore in the first level, 75 feet from the top in the north drift. This mine is the best developed mine in the district, except the Henrietta. There have been some Denver parties examining it, with a view of purchasing. A Denver mining man says if he had a mine like this in Cripple Creek, Colorado, \$100,000 would be nowhere, or no price for such a property.

The Dividend mine is looking fine. Messrs. John Andrew and Butler deserve credit for having the stamina to develop such a mine, which has been dormant for ages under a U. S. patent.

John S. Jones' 15-stamp mill is running night and day on ore from the Little Jessie dump, which pays \$9 per ton, a pretty good showing for a paltry dump of several thousand tons.

Tom McDonald and Wm. McCoy have struck very rich gold ore in a mine supposed to be an extension of the 79.

The Henrietta mill, under the management of Nick Palmer, is turning out lots of bullion. Jesse Davis and Len Laphoon have a fine looking gold mine on Big Bug. It is what they call low grade, running \$15 per ton.

SIX CLAIMS SOLD.—Prescott *Journal-Miner*: An important mining deal has been consummated, in which the title to six mining claims on Castle creek was transferred from F. A. Lehman to A. Falco, Colin Timmons, J. M. Watts and H. Blauvelt. The consideration is not given out, but it runs away up in the thousands. The property is a free-gold proposition. The claims are already pretty well developed, but a force of men will be set to work at once, to further develop them. Mr. Blauvelt will have the superintendency and will leave tomorrow to commence operations. The sale of this property, together with one or two other sales that have been made recently in the same

section, will give quite an impetus to Castle creek district. Mr. Falco, who recently came here from Colorado, has manifested great faith in this section, as is shown by the investments made by him. He is a thoroughly practical mining man and has already proven a valuable acquisition to this section.

NEW DEVELOPMENTS.—Yuma *Sentinel*: The Harqua Hala district bids fair to heat her magnificent record of the past year at least 50 per cent. The opening of the Golden Eagle mine in connection with the new developments in the Gold Hill, the double compartment working shaft, the ten additional stamps to their mill—now 40—and other enlarged facilities, the former production of \$50,000 per month will be doubled. Several important discoveries have been made in the camp lately, chief among which is the Delhi claim, near Harrisburg. The find is as rich as anything yet discovered, the rock literally glistening with the yellow stuff. Rarrick and others are showing up good mines. Charles Hall of Goldfield is continuing his developments on the Quinn Broe' mine, an extension of the Bonanza, and no doubt they have a good thing. The Delhi property, adjacent to the Bonanza, is being worked on bonds, and it is a certainty that the transfer will be made.

San Pablo district is situated on the north side of the Gila river, opposite Gila city, and 16 miles east of Yuma. It is a camp that is attracting the attention of the mining classes with increased interest. It is now believed that many of the mines heretofore known to be rich on the surface will be thoroughly developed, and with such results as will prompt activity in various branches of business. It is estimated that there are now 100 men directly engaged in mining and developing in the district.

Parties in from Pot Holes say that the Indian and Mexican miners there are doing a good deal of placing with good results.

IDAHO.

AN ELECTRIC HOIST.—Wardner *News*: The Bunker Hill & Sullivan Company is putting in an electric hoist in the Bunker Hill mine. A number of new ore cars are now en route from Chicago, and as soon as they arrive active work will be done in stopping ore recently found in the west branch of the Reed tunnel. The number of men now on development work amounts to 38. The regular underground force of 200 remains about stationary, with the usual number of new men being put on each day to supply the places of those either quitting or discharged.

MONTANA.

THE COPPER MINES.—Butte *Inter-Mountain*, March 10: The Moulton mine and mill have been closed down again. The Butte sampling works are operating to their fullest capacity and have run more continuously the past two months than ever before.

A great many mines are being worked on a small scale, the miners being in search of copper, while they take out barely enough silver to pay expenses. One notable exception is the Eveline mine, which is regarded as a fabulously rich property, carrying large quantities of pure native, wire silver and gold. It is said the Eveline mine produces the richest ore ever found in this district.

The copper mines are all working as usual. Machinery is being placed in position at the new converter building of the Anaconda Company. The foundations for the five large engines are completed and two of them are in position. Four of these engines will be about 200-horse power each and one about 500-horse power. Men are putting them up as fast as they can get the machinery, which is arriving very slowly. The boilers are nearly all in place. There are to be six large boilers, all but one of which is there, and in one of them steam is constantly kept up. The greater part of the power developed by these engines will be used on the six air compressors for the converter in the building above. There are six stands ready for converters in the building, on four of which the converters are already in place, and the others can be put in at any time.

OREGON.

ANOTHER MILLING PLANT.—Baker City *Democrat*, March 5: Messrs. Logan & Young, miners on Upper North Powder, go to Athena, Oregon, to arrange with the other partners, Messrs. Dr. King and Answorth, of that place, to buy and erect a mill the coming season on their valuable property. Their mine, the "Illinois," assays from \$20 to \$75 to the ton.

NEW MILLING PLANT.—Baker City *Democrat*: Among recent arrivals in Oregon's Denver is Mr. J. G. Chapman, of Arcata, Cal., who is here to look after important mining interests. Mr. Chapman and Mr. B. Doe, of San Francisco, have a bond on the Pyx mine, situated in the Robinsonville district, about 40 miles southeast of the city. The mine has been worked all winter and the results have been most satisfactory to all parties concerned.

The gentleman has a milling plant here, which he shipped from San Francisco, and it will be shipped from the mine at once, Mr. Thos. McEwen having been awarded the contract for hauling the machinery from McEwen to the millsite. Mr. Chapman says that the tunnel is in 415 feet on the Pyx mine, and a shaft taps the ledge at a depth of 160 feet. The vein is two feet wide and the ore assays from \$20 to \$250 per ton. Only five stamps will be used at present, but five more will be added in a short time and it is probable that before the year ends the plant will be running to its fullest capacity, dropping 20 stamps.

STARTED UP A MILL.—Jacksonville *Times*, March 12: The Lucky Bart Mining Company have started up their mill, which has been idle for some time owing to the unfavorable weather.

Dr. J. Hinkle of Central Point is developing

a quartz mine in Sardine Creek district, which promises well. He thinks that he has a genuine fissure ledge.

The Annie mine in the Bohemia district has shut down until the snow settles, when there will be some improvements made. It is reported that McGee & Co. took out nearly \$5000 in their short run.

The placer mines in Foot's Creek district are running on full time and the miners are much elated over the prospect of a good cleanup. The season's output for this district is expected to reach up well toward the \$600,000 mark.

WASHINGTON.

THE METALINE PLACERS.—Spokane *Review*: Placer mining on the Pend d'Oreille river, in the eastern portion of Stevens county, promises to assume great proportions during the present year, and the property owners in that district expect to see a large population in the town of Metaline before the summer season is half over. Eastern money is already finding its way down the river from the Great Northern from Newport, and already the Newport Transportation Company is making preparations to build a large steamer to carry the traffic. The people of the Colville valley are also becoming enthused and are taking an active interest in pushing a wagon road through the range from Colville to Metaline, a distance of about 40 miles. The miners in the Metaline are making good wages by the use of rockers, with an inexhaustible field of pay dirt to operate upon.

Notices of Recent Patents.

Among the patents recently obtained through Dewey & Co.'s SCIENTIFIC PAPER U. S. and Foreign Patent Agency, the following are worthy of special mention:

CAR VENTILATOR.—Thos. E. Merrill, Oakland, Cal. No. 516,058. Dated March 6, 1894. This invention relates to that class of ventilators especially adapted for cars and other moving vehicles, and in which a rotary fan driven by the exterior air currents is employed to exhaust the foul air from the car or vehicle. It consists in a casing having a passage through its lower portion from end to end, and an opening in the upper portion of its inner side, exposed to or in communication with the interior of the car, and a fan mounted in said casing and exposed at its lower portion to the current of air which passes through the bottom passage of the casing whereby the fan is rotated and the fine air is sucked out through the side opening of the casing and discharged by the fan through the bottom passage.

FILTER.—Wm. Weir, S. F. No. 516,140. Dated March 6, 1894. This invention relates to that class of filters in which a single valve, provided with two or more ports, controls the inflow or exit of water from a chamber containing suitable filtering media, it also combines the use of a simple hub for draining unfiltered water for household purposes by turning the plug in an opposite direction from the normal in draining filtered water, thus saving the cost of a superfluous hub.

HORSESHOE.—Z. Birdsall, S. F. No. 516,046. Dated March 6, 1894. The object of this invention is to provide a shoe with front toe calks formed on the line of curvature of the foot of the shoe and separated from each other, and a series of pointed calks of different elevations extending around the periphery of the shoe to the heel, with a projecting ledge for the oil holes. Shoes made in this manner may be used in the winter season until the points are worn down, when the shoe may be taken off and laid away for use in the summer as a flat shoe.

A CAN BODY-MAKING MACHINE.—Clarence M. Symonds, Sao Francisco. No. 516,033. Dated March 6, 1894. This invention relates to improvements in the manufacture of can bodies. It consists of a mechanism whereby the sheet of tin is taken and bent up into a partly cylindrical form: then has hooks formed upon its edges adapted to interlock; is then carried forward and these hooks interlocked; then compressed or locked together to form a cylindrical can body. The movements are intermittently and successively produced by the reciprocation of a bar or body around which the tin is bent to form the can.

A SLIP-CUTTER FOR INDEX PURPOSES.—Alexander J. Rudolph, Sao Francisco. No. 515,119. Dated March 6, 1894. This invention relates to a device for cutting slips for index and library purposes. The object is to facilitate the cutting of entries from printed works for insertion in the leaf-holders of index and file devices. In making up these leaf or slip-holders, catalogues, journals, and other works which have already been printed are utilized by cutting out the lines which it is desired to employ in the index. When very narrow spacing is used, as with nonpareil type, the apparatus makes a neat separation between the lines. It consists of a cutter, movable with relation to the table upon which the sheet to be cut is placed, and gauges by which the slip is accurately placed with relation to the cutter.

STEAM ENGINE.—Eugene Shydecker, Sao Jose, Cal.; assignor of two-thirds to Jobo H. Moore, Sao Jose, Cal. No. 516,064. Dated March 6, 1894. This invention relates to improvements in steam engines. The object is to combine in a single apparatus mechanism for utilizing the steam directly from the boiler to an initial high-pressure cylinder, exhausting it into a second cylinder, where it is utilized to drive a piston, which in turn acts on its return stroke to pump the steam into a super-heater from which it is again delivered to a third cylinder, where it acts upon a piston, and finally passes thence into a reactionary wheel mounted upon the engine shaft, being finally exhausted from this wheel. The whole apparatus is designed to utilize the power of the steam to its very last profitable limit of expansion, and during this process of expansion to superheat the steam so as to restore its elasticity, which is partially lost during the expansion.

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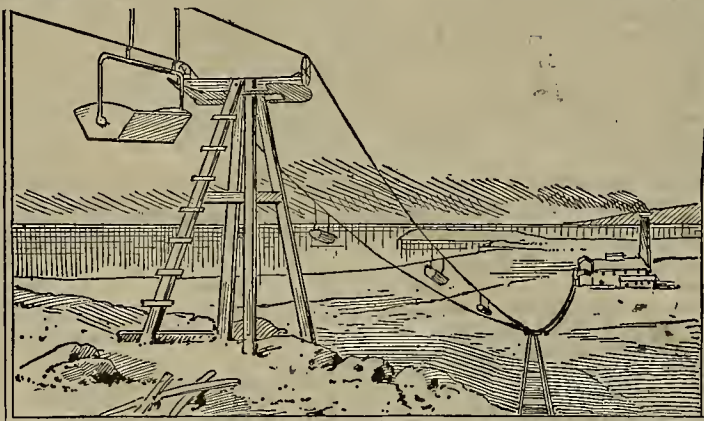
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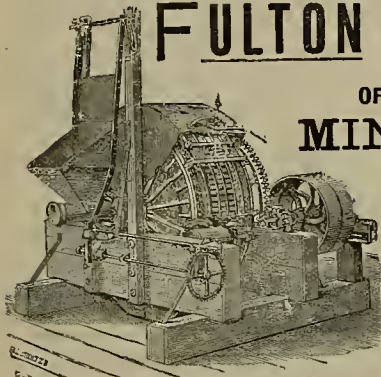
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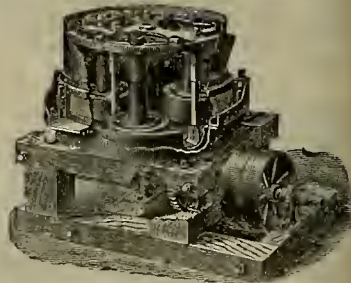
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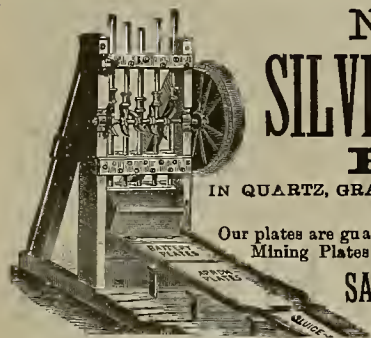
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The Union Inclined Ropeway.

The illustrations on this page are designed to show the workings of an inclined self-acting ropeway, and a new device for its control, manufactured by the Union Iron Works. The lower cut shows the former method; the upper, the new terminal. The illustrations are so clear as to be self-explanatory.

By the system shown in one the rope passes over a supporting sheave and around the upper terminal to which the brake is applied. The improvement consists in making the supporting sheaves and guide sheaves one, and rendering the movement of the rope firm and steady by a reverse turn over the upper vertical sheave. The brakes are applied to the lower sheaves, whose motion is in opposite directions.

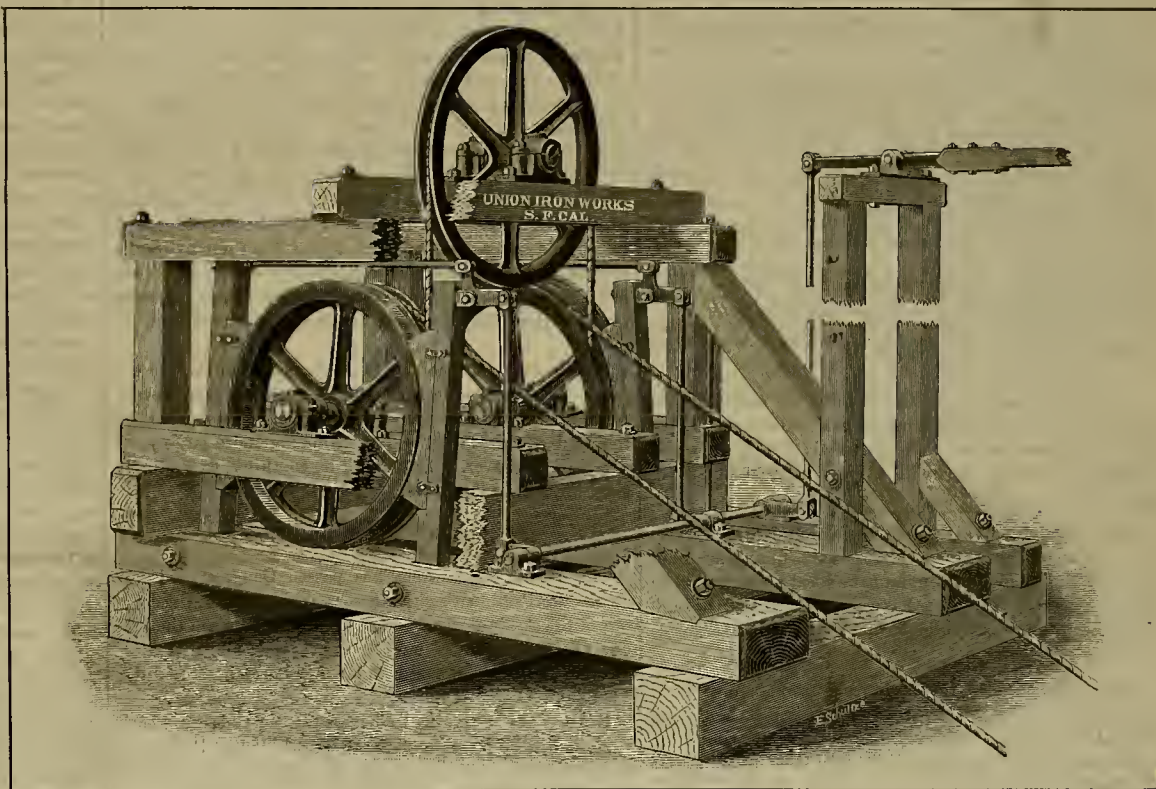
A NEW QUARTZ CRUSHER, known as Davey's patent ram hattery, is reported from Australia. The machine is a simple adaptation of a one-stamp mill, the only difference between it and the ordinary hattery being in the formation and construction of the box, which in this instance is of a cylindrical form and made of $\frac{1}{2}$ -inch boiler plate iron instead of cast metal. It is in two sections, strongly bolted together at the angle joints. A cast steel shafting passes vertically through the center of the box, to the lower end of which is attached the stamp head, the upper end being connected by a shackle and chain to an overhanging spring beam. To the top of the cylinder is bolted a circular iron plate, upon which a man stands to work the shaft and thus impart the necessary action to the stamp. The stamp head is of chilled steel, and weighs about 200 pounds, the total weight of the machine altogether being

in the neighborhood of 850 pounds. All the working parts are of cast steel, and everything about the crusher is so constructed as to be quickly taken to pieces and as easily re-erected. The patentees claim that it will treat

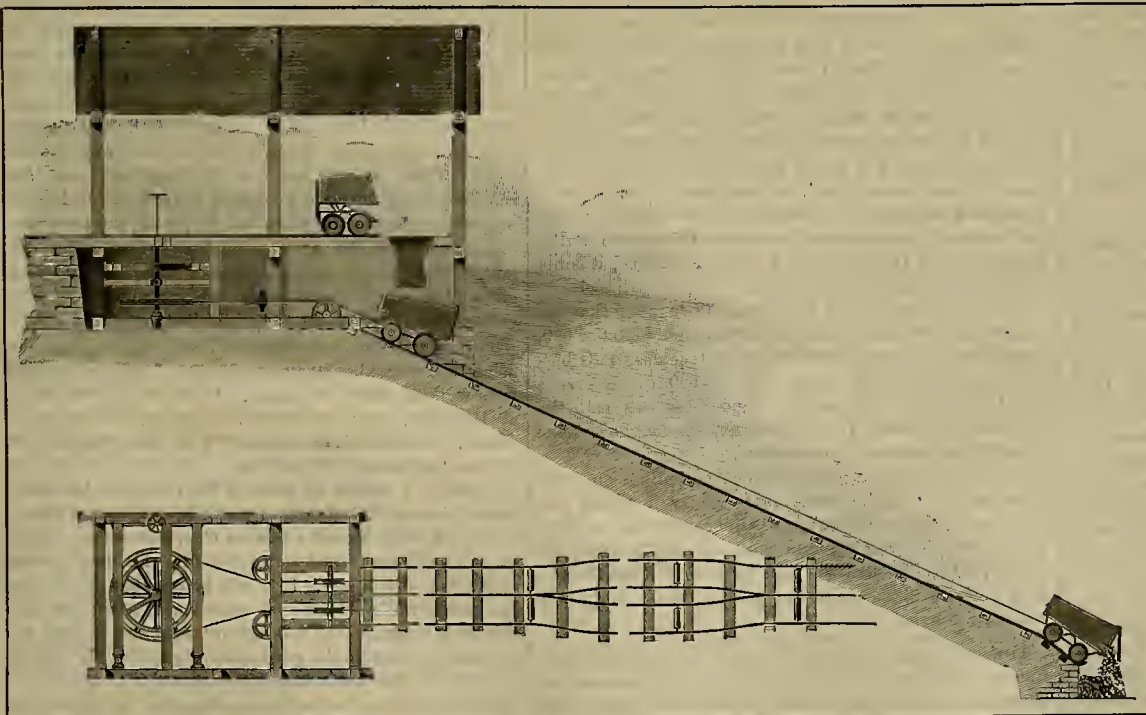
from one and one-half to two tons of rock per eight hours.

It is interesting to note that the determined fight by the miners of New South Wales for private ownership of mining property is at last making headway, and that the legislative council is about to pass a bill having that object in view. The measure is a violent departure from the policy of land ownership which has heretofore obtained in Australia, and for that reason encountered the bitter hostility of the great landlord class. It is not expected that the measure as it passes will be perfect, but it will be an entering wedge, and desired changes can hereafter be made as needs require. The mining laws of the United States are a very long way from what they ought to be; but the principle of private ownership is firmly established here, and when title to mining ground is once obtained it is as secure as any other.

THE stimulus given to gold-mining operations during the past year has been of great benefit to the development of Oregon mines. It is confidently stated that the gold output for 1893 was larger than ever before—it probably reached \$2,000,000—and during the present year a very much heavier yield may be expected. Oregon has been a severe sufferer during the present depression. Its chief industries have been the production of wheat and, in eastern Oregon, of wool. Both these are depressed to an unprecedented degree. The activity in mining stands out brightly in the midst of the general stagnation.



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San Francisco, March 24, 1894.

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It is claimed at Cripple Creek that the new bromine process of Prof. Englehardt has succeeded in saving 95 per cent of the assay value of the ores and that the cost of treatment by his process will vary from \$2.50 to \$6 per ton.

Wood is reported very scarce in Nevada City. Owing to the rain and snow, the teamsters are unable to haul fuel from the woods to town, and the local supply is well-nigh exhausted. The price has now reached \$8 a cord. Many families are said to be burning boards and scraps of all kinds.

PERMITS to mine by the hydraulic process have been issued by the California Debris Commission to the Spring Gulch Gold Mining Company, operating the Spring mine at San Andreas, Calaveras county, and the Kate Hayes Mining Company, operating a mine at French Corral, Nevada county. In all, the Commission has received 54 applications and has issued 24 permits.

THE managers of the mining exhibit at the Midwinter Fair calculate that at least \$2000 more will be necessary to carry on the exhibit, and it is to raise this sum that an appeal is now being set forth. At the beginning it was proposed to raise \$10,000. The amount raised was only \$7578.10. It is thought that the mining men of the State ought to come forward to make the sum \$10,000, and to insure the successful carrying on of the greatest mining exhibit, in the opinion of experts, ever collected. Unless the money shall be raised it will be necessary to run the mill a very limited time each day, as well as to place the exhibit under other restrictions, which would seriously impair its usefulness.

It is extraordinary that the United States Government has no department especially devoted to promotion of the mineral interests. The mining industry in this country, in its various branches, is hardly less important than agriculture, to which the services of a Cabinet officer and a department are especially devoted. But there is nothing of the kind for the mines, not even a bureau. The Geological Survey is attached to the Department of the Interior, and the collection of statistics and general information is a part of the duties which devolve upon the Director of the Mint, who reports to the Secretary of the Treasury. It is not too much to say that the government cares less for its mines than for any other industry equally great.

He Will Use the Veto.

CHICAGO, March 22.—A Washington special says: The President will veto the Bland bill. He reached this conclusion last night. He has prepared the draft of the veto message, and will submit it to the Cabinet to-morrow. For this statement there is the authority of one of the closest financial associates of the President.

Activity in Gold Mines.

The expectation entertained a year or two ago, and freely expressed in these columns, that California was on the verge of a general revival in gold mining, is being pretty fully realized, as we all know. More capital has been invested in mining properties during the past year than for several years preceding. The aggregate was no doubt to some extent restricted by the financial depression, though the paralysis of other industries was a very strong reason so much attention was paid to gold production. The various foundries and machinery agents in this city report that there is more proportionate demand for quartz-milling machinery than for any other kind. As a matter of fact, they have not done a great deal besides repair work in other lines. The recent sale of the Good Hope mine, in Riverside county, for \$500,000, and the purchase of a twenty-stamp mill from the Union Iron Works, is a case in point. The syndicate of which Dr. Stephen H. Emmens is the head has made heavy investments in Amador county, and has just purchased another mine—the Normandy—in Nevada. The McCaw brothers propose to do something with the famous Hite mine in Mariposa. A syndicate has just bought the Gwin mine, in Calaveras. James D. Hagne has made extensive purchases in Nevada county. The well-known Alison Ranch, a heavy producer in times past, is believed to have been purchased by capitalists, and will be re-opened. The La Grange company has made enormous investments in Trinity county for the development of newly-acquired property. The Plumas-Imperial Mining Company the Quincy Water and Mining Company and the Kate Hayes Mining Company have made large expenditures to develop their hydraulic properties in Plumas and Nevada counties. And there are many others. The list given is named as they occurred to the writer. They are mostly instances of actual development.

No doubt even more will be done during the present year. The hydraulic mines have got a fair start toward resumption. Quartz properties are being very generally inquired after. Drift mining is being more largely engaged in than ever. The outlook is, we think, exceedingly good for California mines.

Coining Silver Bullion.

The Bland bill, which has passed Congress and now awaits the President's signature, provides first for the coining of the "seigniorage"—the difference between the real and nominal values of our silver coinage—and thereafter of other bullion purchased under the Sherman act of July, 14, 1890.

Experts are beginning to discuss the methods by which the bill will be put into effect, if signed by the President. It is understood that the mints throughout the country, immediately after the bill is signed, will begin the work of coining silver dollars out of bullion. It is estimated that it will take about four years to do this work. It is thought, however, that were the bullion distributed among three mints in proportion to their capacity the work could be completed in much less time, but the cost of transfer, it is believed, is too great to make this distribution advisable.

As stock is held at present, San Francisco, coining \$1,000,000 a month, would take 16 months to finish its stock. It would take the New Orleans mint 12 months at the same rate of speed. The balance of the bullion, amounting to 118,000,000 ounces, or, when coined, \$150,000,000, is at the Philadelphia mint, and unless an extra shift of men be put to work it would take five years, it is estimated, to coin its stock and, at the same time, do such other work as occasion might require. In view of the fact that it costs \$5 per thousand to transfer silver from Philadelphia to New Orleans, and \$8 to San Francisco, it is not likely that this shift will be made.

In this connection it is interesting to state that the present stock of bullion cost the Government \$126,000,000, the average price per ounce being 90.9 cents. This bullion, when coined, will make \$180,000,000, the difference of \$54,000,000 being what the Bland advocates call the seigniorage or profit. It is this seigniorage for the coinage of which the proposed law provides.

It is also stated that were the stock of bullion on hand to be purchased at the market price to-day it would cost but about 60 cents an ounce, a difference of 30 cents. This would make the total stock on hand cost but \$84,000,000, or \$42,000,000 less than was paid for it, or \$93,000,000 less than what Bland maintains the present stock of bullion coined will make.

THE tariff bill has been reported to the Senate in substantially the same form as amended by the sub-committee. Quicksilver and crude or borate of soda, or borate of lime, are on the free list. There is no change in the 4 cent duty on lead, as well as iron and coal.

California Mines at the Midwinter Fair.

Butte County.—The design of the collectors of Butte county's exhibit at the Midwinter Fair appears to have been to show the variety of its mineral products and to emphasize, by ocular evidence, their special characteristics as well as their usefulness. The most active quartz-mining district in Butte county at the present time is Forbestown; therefore a great mass of ore from the Gold Bank mine occupies the place of honor in the center of the exhibit. The characteristic of Forbestown ores is the presence of sulphurets in large quantity, and these specimens are finely adapted to display their character. Large clusters of sulphurets appear on the surface of the quartz, so conspicuously as to attract immediate attention. One chunk of ore weighs 2900 pounds, being one of the largest in the whole mineral collection. Other features of this exhibit, outside a large general collection of ores, are specimens from the river mines and hydraulic mines of the county, and 53 collections of sulphurets in their various forms from the time they are taken from the concentrator until they are oxidized after leaving the furnace.

It is proper in this place to make mention of the Forbestown district, which appears so prominently in the exhibit, whose merits are extolled by the well-informed gentleman in charge, Mr. Frank Early. The Forbestown veins were worked many years ago, but, on account of the "rebellious" nature of the ores, they were abandoned. The quartz yields only a few dollars in free gold, bearing four per cent of sulphurets, more or less. Appliances for working such ores were not so efficient then as now and the district, after enjoying a great deal of activity, was practically abandoned. Within the past few years, however, Forbestown has again attracted attention; and a determination on the part of practical mining men to resume mining operations has been carried out with great success. Chlorination has effected the desired objects. Results secured at the Gold Bank—the chief mine in the district—may be used for illustration. The ore bears about \$4 in free gold and four per cent sulphurets. These are worth \$250 per ton. The value of the sulphurets per ton of quartz is therefore about \$10, which, added to the \$4 free gold, makes a total of \$14. Forty stamps are dropping day and night in the mill, and the chlorination works have a capacity of eight tons per day. The capacity of the mill is 110 tons per day. The daily payroll—mine, mill and chlorination works—is \$200 per day. If these figures are correct—and they are said to be authoritative—the total labor cost of mining, milling and chlorination is less than \$2 per ton. They teach, also, another useful lesson, viz.: It would doubtless be possible to make a profit out of the mine and throw the concentrates away, which could not be done during the former period when the mines of the district were worked. Both mining and milling appliances have shown great improvement since that time.

Sulphureted quartz from the Shakespeare and Golden Queen mines of Nickerson & Vail, Forbestown, are also shown. They have precisely the same character as the Gold Bank ores, and are doubtless worked as profitably.

Fine specimens of ore from the Banner mine, on the west bank of the main Feather river, are displayed. It is interesting to state that this mine, which had been abandoned, is under the management of Col. Frank McLaughlin, and its value has been successfully demonstrated. It is said that the mine yielded \$680,000, but the vein pinched out completely at the 300 level. There was evidently a fault in the ledge. Various unsuccessful attempts were made to find the ledge. Finally, Col. McLaughlin took hold of the property, sank 200 feet vertically into the country rock, crossed it, and found the ledge in place. Arrangements are now going forward actively to develop the property. An electric plant will be put in, the power being secured from the old Miocene ditch, three miles distant, whence it is transmitted to the mine. A 10-stamp mill and all works necessary to the systematic development of the property are to be installed.

The quartz from Butte county mines is by no means deficient in free gold. Many specimens of the latter kind from working mines are shown. From the Phoenix mine, at Hurleton, very fine quartz averaging \$12 per ton is shown. There is also a collection from the Standard, of the average value of \$20 per ton.

There is a variety of gravels from several hydraulic mines, the most interesting of which is, perhaps, a collection of 12 boxes from the famous Cherokee mine. These show the different strata encountered in the development of this gravel property. It is well known that its working by the hydraulic process was abandoned partly because the bank became about 500 feet in height and it was too expensive to handle the great mass of gravel. Litigation also did its share toward securing suspension of operations. Works are said to be under construction by which the mine will be opened by the drift process.

Two boxes of gravel from the Golden Feather mine

call to mind the most interesting achievement of mining operations in Butte county and the most elaborate and expensive attempt now being made—if not ever made—to work the river channels of the State. In connection with the Golden Gate, an adjoining claim on the Feather river, a vast sum has been expended. A summary of the work necessary to be done before actual mining operations could begin may be given: First, there was the building of ten miles of substantial roads; the providing of dwellings in three separate camps capable of accommodating from 150 to 300 men, besides the necessary workshops; also the building of a canal along the right bank of the Feather river, 40 feet wide and 6000 feet long, requiring the excavation of 50,000 cubic yards to carry the river when turned out of its natural bed; the construction of a permanent head dam; the procuring of power, which was obtained by repairing the old Miocene ditch, which required five miles of iron piping; also the erection of an electric plant, to enable the work to be carried on by night as well as by day, and the connection of all the different points and the ditch stations with the head offices by telephone, requiring over 40 miles of telephone wire.

In the construction of the canal, a cemented rock wall was carried along the entire distance next the river, at a width of four feet on top and twelve feet on the bottom, reaching, in places, a height of over 20 feet from bedrock, containing over 10,000 cubic yards of masonry; in the construction of which 6000 barrels of Gillingham cement were consumed, costing \$4.68 per barrel laid down at the works, bringing the cost of the wall up to \$7.50 per yard.

Two suspension bridges cross the canal, giving access to the work from the shore. One of the bridges is 80 feet long, carrying the pipe-line across that conveys the water power from the Miocene ditch. The company has the use of 1000 inches of water in return for repairing and keeping the ditch in order.

The head dam of the Golden Gate claim, about 2½ miles above Oroville, has a total width of 374 feet and a height of 52 feet. The works are in many respects similar to those of the Golden Feather. Ool. McLaughlin is manager for both companies, whose stockholders are English.

Other features of which mention should be made are the display, in the general State exhibit, of fine specimens of river, placer and leaf gold, and five small pieces of platinum, which were found in the Oberokee mine. Kaolin from an extensive deposit three miles above Oroville is also shown. It is said the presence of this deposit of kaolin has been traced ten miles.

A summary of Butte county's whole exhibit is contained in the following:

Gold-bearing quartz, showing free gold, from the Standard mine; sulphurets from the same mine; gold quartz from the Gold Bank mine, carrying four per cent sulphurets; gold quartz from the Mascot mine of Oregon City; gold quartz from the Golden Queen mine of Forbestown, rich in sulphurets, worth \$202 a ton; gold-bearing quartz from the Golden Banner mine of Oroville, sulphurets, worth \$8000 a ton; gold quartz from the Shakespear mine of Forbestown; gold quartz from the Rainbow mine at Yankee Hill; gold quartz from the Aurora and Argonaut mine at Lompkin; gold-bearing quartz from the Climax mine at Hurleton; gold quartz from the Phoenix mine at Hurleton; gold quartz from the Judge Gray mine at Hurleton, \$8 per ton; gold quartz from the McMillan mine of Hurleton; gold quartz from the Pezleg mine at Oroville; gold quartz from the Williams mine at Yankee Hill; gold quartz from the Myers mine at Enterprise; gold quartz from the Root, Rapp & Bollinger mine at Enterprise; gold-bearing cement gravel from the Bangor, Oregon Gulch, Morris Ravine and Magalia districts, from the Cherokee hydraulic mine and from the Golden Feather mine; marble from the Merrimac district, polished and unpolished; black marble, polished and unpolished, from the Pentz district; soapstone from the Horse-shoe district; sandstone and tufa from the Pentz district; kaoline from Oroville; iron ore from Oroville; manganese from Magalia, carrying 70 per cent; chrome iron ore from the Pentz district; fossils showing shells; lava needles; bowlders washed down by hydraulic mining; crystals; case showing gold, silver, copper, lead and iron ore, 50 specimens; Indian relics, 85 specimens; sulphurets from the various mines of the county, 53 samples; model of the famous Willard nugget found in Butte county, April, 1862; weight 835 ounces; value, \$13,312; model of another nugget, weight 132 ounces; value \$2112; case containing specimens of rock from the various mines, including gold-bearing talc, gold-bearing jasper and gold-bearing chaledony; case of petrifications, including water formations, petrified and agatized wood, petrified potato, petrified chicken, petrified manzanita knot and jaspers; case containing antimony, asbestos, fire clay, calcite, serpentine, diabase, porphyry, gypsum, quartz, crystals and amethysts; case of specimens containing free gold, sheet gold, nuggets, placer gold, river gold and gold dust.

Sierra County.—The most prominent feature of the Sierra county exhibit is the great gilded obelisk, which rises from its center to a height of twenty or more feet, and which is designed to represent the bulk of the county's gold output since the discovery of gold. The weight of the output is stated to be 596,000 pounds; cubic contents, 535 feet; value, \$180,000,000. It is a popular thing among the various counties to afford in this manner, by actual demonstration, a conception of the value of the resources. The representations are in various forms of the one general idea, and it is not too much to say that Sierra is one of the most happy of all. The display as a whole is unpretentious, the chief object being to show the average character of the county's milling ores in virgin form. This

aim has been completely accomplished, quartz from twenty different mines under development being displayed, as well as river, placer and drift gravel. The exhibit is not bulky, but the varieties of ore, from free-milling to sulphuretted and "pocketty," are adequately shown. From one mine—the Empire, in Gold Valley—unique specimens of sulphuretted rock are shown, the rock being completely hidden by the sulphurets. The leading mine of the county, the Gold Bluff, is represented by views of its surface works and its various officers, as well as by quartz. Fac-similes of gold brick and amalgam balls before retorting are also shown. If the display is wanting in any respect it is in gravels, of which but few specimens are to be seen. These, however, are very good.

It is intended to place on exhibition soon a paraffine cast of Sierra county topographically, giving an idea of its mountains, its geologic formations and the location of its different mines and mining districts. This will, no doubt, be a valuable contribution to the exhibit. Mr. Robert Forbes is in charge.

The Sierra county exhibit, as a whole, is as follows:

Gold ore from the William Tell mine in the Sierra City district; gold ore from the Gold Bluff mine of the Downville district; gold ore from the Empire mine in the Gold Valley district; gold ore from the Mountain mine in the Sierra City district; gold ore from the Young America mine in the Sierra City district; gold ore from the Oxford mine in the Downville district; gold ore from the Nip and Tack mine in the Downville district; gold ore from the Phoenix mine; gold ore from the Butte extension mine in the Sierra City district; gold ore from the High Commissioner mine; gold ore from the Butte Saddle mine in the Sierra City district; gold ore from the Independence mine in the Wolf Creek district; gold ore from the Mexican mine in the Downville district; gold ore from the Sacred Monnd mine in the Sierra City district; gold ore from the Milton mine in the Sierra City district; gold and copper ore from the Pride mine in the Sierra City district; ribbon quartz from the Gold Bluff mine in the Downville district; gold-bearing gravel from the Downville mine in the Downville district; gold-bearing gravel from the Bald Mountain extension in the Forest district; gold-bearing gravel from the Wide Awake mine in the Downville district; marble from the Sierra quarry.

Slitkens.

The Montana output of copper for last year was 150,092,711 pounds; for Michigan, 113,462,129 pounds; for Arizona, 43,717,425 pounds.

The Purdy Gold Mining Company has been incorporated in San Francisco. Directors—H. C. Gilbert, O. A. Poage, H. L. Gilbert, H. W. Snow and I. L. Gilbert. Capital stock, \$1,000,000.

The Lethbridge, B. C., coal-miners' strike did not last long. When the men found that their places could be supplied they made concessions, which were received, and the men returned to work.

The Sunrise Gold Quartz Mining Company has been incorporated in San Francisco. Directors—E. H. Baxter, George F. Hill, D. J. Halloran, E. F. Baxter and James P. Sweeney. Capital stock, \$1,000,000.

MELVILLE ATWOOD, M. E., has received a letter from S. P. Dorsey, principal owner of the Maryland mine, in which it is stated that the pay chute had been reached on the 1600-foot level when the fire occurred. The ledge is eight feet wide. Operations will be resumed in about ten days.

The Tacoma smelter shipped 1600 bars of bullion, weighing 175,457 pounds and valued at \$36,296.12, during February. There were 1063.66 ounces of gold, valued at \$21,895.85; silver 14,196.98 ounces, valued at \$816.32; lead, 174,417 pounds, valued at \$5493.95. Fifty-eight men were on the payroll and \$3437.80 disbursed.

FARMERS on river bottoms are getting impatient with so much dampness, but the placer miners are all happy, says the *Rogue River Courier*. The rain keeps the farmers shut in the house when they think they ought to be at work in the field; but the more Jupiter Pluvius turns the bottom of his pitcher up, the more the placer men smile, as they wash away the red banks and uncover the glittering nuggets.

FRANK HOBBERO and George V. Holcomb are advertised by local papers as having engaged in questionable mining transactions in southern Oregon and Siskiyou county, Cal. They bonded mines right and left and never paid a cent. Holcomb, after putting up a mill in Siskiyou he had obtained from Jackson county, Or., on a mine he had bonded, levanted, leaving 15 employees and various other victims in the lurch.

CAPT. J. R. DE LAMAR, the well-known mining man, is in the city accompanied by his wife. Mr. de Lamar has achieved the doubtful distinction of being written up in the local press as the Monte Cristo of the West, who, five years ago, was a poor sailor, went to Idaho, found a mine worth millions, and has now married one of the 400 and is on his way around the world with the evident intention of taking possession of it.

The Poorman mine, the property of the Cœur d'Alene Silver and Lead Mining Company in the Cœur d'Alene district, Idaho, has been sold to English capitalists for \$500,000, of which \$100,000 is to be paid down and the balance in two equal payments at six and twelve months. The property is one of the greatest lead producers in the country, and for the past six years has paid dividends regularly until the last three or four months, when it has been worked only sufficiently to pay expenses.

The syndicate of Denver capitalists who took a bond on the Mercut gold mine in the Camp Floyd district, Utah, for \$750,000, have obtained another extension until April. It is stated that the reason is that the Colorado capitalists who have the bond from the Mercut company, are selling the mine to a company of Eastern capitalists for \$1,500,000. The Colorado capitalists are all satisfied with the mine, but the Eastern company will not take the report of their experts and are having the mine thoroughly experted.

The placing of coal on the free list in the United States will not have any appreciable effect upon our trade with that coun-

try, except so far as the cheapening of the article may encourage increased consumption, remarks the *Australian Mining Standard*. Those who are anxious to see our coal trade expand should gladly welcome any movement in the direction of freeing the markets of the world, and though it is too much to expect that any direct advantage will be felt by our coal-owners, the circumstance referred to is an encouraging one.

The DeLaval process of electrical extraction of metal from the ore is being practically applied at Trollhattan, Sweden, where a waterfall has been secured for the purpose. The experiments have hitherto been confined to Granesburg ore, but will, it is understood, soon be extended to the iron ore from the vast deposits in north Sweden. It is expected in some quarters that DeLaval's invention will revolutionize the Swedish iron industry. The process is said to be both simple and cheap when water power is available, and is already attracting much attention.

W. M. GWIN, shipping commissioner of San Francisco and owner of the famous Gwin mine in Calaveras county near Middle Ber, has executed a bond of that property to F. F. Thomas, formerly superintendent of the Kennedy mine. The new company with Mr. Thomas at its head means business, and already Knight & Co. of Sutter Creek are figuring upon hoisting machinery capable of sinking 2000 feet. It will be run either by water or by electricity with auxiliary steam connections to be used in case of failure of water. The company hopes to be able to commence work by the first of April.

The Potosi Mining Company has elected the following officers for the coming year: A. K. P. Harmon, president; Thos. Cole, vice-president; and Thos. Anderson, E. P. Berrett and D. C. Bates, directors. C. E. Elliot was re-elected secretary, and his financial statement showed a credit of \$1059.08. The annual bullion statement was as follows: Total production, \$294,732.20; of this, \$88,342.10 was in gold and \$206,390.10 in silver. The discount was 28 per cent, or \$83,097.79. Net returns, \$211,634.41, less cost of milling, \$91,849.35. Net returns over cost of milling, \$119,785.06. H. H. Gorham was elected superintendent, vice A. C. Hamilton, resigned.

The Colorado smelters have issued a new scale of prices, to which sulphur and silica penalties are attached. Twenty-five cents will be charged when the ore contains from 3 to 12 per cent of sulphur, and \$3 per ton will be added to the treatment charges when the sulphur reaches 12½ per cent. Silica will be charged for at the rate of 15 cents for each per cent in excess of iron. It is claimed that other changes will be made in the rates that will equalize the total, and make the smelting charges no greater than they have been heretofore. This offers an opportunity to the miners to study the composition of their ores, and do a little mixing to avoid penalties.

A. L. HOLMES, of this city, has just returned from the Four-mile placer gold mining district of Wyoming. "The 'burial process' is being introduced there for saving fine gold, and it is thought to be a great success," said he. "If such proves to be the case, that district will make one of the richest placer fields in the West, there being a scope of country, 30 miles wide by 40 or 45 miles long, that carries gold in the sand from the grass-roots to the bedrock, which in some instances is 18 feet below the surface. One peculiarity of the gold find is that, while some of it is very fine, it is not what is known as flake or flour gold, but under the glass it shows up distinctly of a lumpy nature."

The Oroville *Mercury* considers the mining outlook in that county very promising. "In the last year," says the *Mercury*, "hundreds of new ledges have been discovered, located and prospected, and it would now appear that only a beginning has been made. Many of these ledges are owned by poor men who will sell at reasonable figures. Mining in this line is not conducted as it once was, haphazard and ignorantly, but it is conducted scientifically. The gold has always been there, only in the past miners did not know how to save it. The best example of this is the Forbestown district. Although the hills there for years were known to be ribbed with gold-bearing quartz, every attempt to work the same resulted in failure. Under the new order of things, every one of those ledges has been made to pay."

The celebrated McBride case is again before the department at Washington. It is one of the most important cases ever brought there, the controversy having arisen over an application for a mineral placer claim valued at between \$3,000,000 and \$4,000,000. There were six locations, each covering 20 acres, on claims made by right of discovery in September, 1889, by M. Topliff, G. P. Topliff, Reed O. McLean, F. T. Crowe, H. R. Laplain and H. O. Leiger, who subsequently sold the claim to McBride. The attorney-general of the State filed a protest against the application, alleging that all the section on which entry was sought is State property; that the land contained no valuable mineral deposits, but was wanted as city property, as it joins Tacoma (wherein its real value lies), while McBride asserted that gold existed in paying quantities, entitling him to the property. Secretary Smith held that a hearing would be necessary to determine the value and extent of the alleged deposits and ordered thorough prospecting of the land. A special agent of the department will be present at this investigation and the case has been made special to secure an early settlement.

The Congress mine, near Prescott, Arizona, which was recently sold to an English syndicate for \$1,000,000 (so the amount is given) belonged to the estate of "Diamond Joe" Reynolds, who was well known on this coast and in San Francisco in particular. He bought the mine for \$1800 from a prospector, and it was worked four years, but shut down when he died. "Diamond Joe" was for many years a cook on the Mississippi river, but eventually became the possessor of a large fleet of freight boats, plying between St. Louis and St. Paul. He was also a heavy investor in Arkansas property, particularly in Hot Springs, and he built the line of railroad running from Malvern Junction, four miles below Little Rock and at the intersection of the Iron Mountain road, to Hot Springs. The road was for many years the only means of entry to Hot Springs and was a source of huge income, being only twenty miles long and the fare between the two points being \$2. He gained his peculiar title because of the large and valuable diamonds which he always wore, and he utilized it also as a trademark, all his steamers being ornamented on each side with the word "Joe" in a white space of diamond shape.

The Colorado Troubles.

Colorado has been the scene of a vast tumult and excitement during the past ten days. A great deal of gory talk has been indulged in, but so far nothing but words have been shed. The situation has now quieted down, and it seems probable that the difficulties which gave rise to the troubles will be amicably adjusted. Denver politics and Governor Waite's contumacy were the origin of the first part of the row, which need not be discussed here. The second arose from the mining troubles at Cripple Creek. The strike of the miners had continued for several weeks without settlement, or prospect thereof; and the mine-owners resolved to take the bull by the horns and start up anyway.

The mine-owners decided upon two propositions, either one of which the miners could accept, and under either system any mine might be started up. The wages offered were \$3 per day for a shift of 9 hours with 30 minutes out for lunch; or \$2.50 per day where 8-hour shifts are worked, with 30 minutes out for lunch. This gave the miners an option and also the mine-owners. Those mines sufficiently developed to work three 8-hour shifts could adopt the 8-hour plan, while those properties not so far developed could adhere to the 9-hour shift. Judge Downer, of the district court of El Paso county, issued an order enjoining the Miners' Unions not to interfere in any way or molest the men who desire to go to work.

Under this plan the Anaconda, Victor, Anna Lee, Summit, Isabella, Strong, Gold King, Gold Dollar, Zenobis, Pharmacist, and others, started up. The Miners' Union determined to break up this arrangement, and armed themselves. The sheriff swore in a large number of deputies to preserve the peace and protect the non-union miners. A conflict ensued, at Altman, and one deputy was shot. The whole region became tremendously excited. The militia was ordered out. Then the district came to its senses. No one really wanted to fight. The miners did not care to antagonize the organized National Guard, and the latter certainly had no overpowering desire to fire on the miners. So the peaceable method of settlement was taken because it was the easiest, most law-abiding and likely to be the most satisfactory.

It seems probable now that the whole difficulty will be adjusted on substantially the terms offered by the employers, as indicated above. These terms are in reality a concession to the demands of the miners. The mine-owners wanted to pay \$3 for nine hours' work; the miners wanted \$3 for eight hours' work. The Independence, one of the largest mines, has started work again with a small force on the basis of nine hours for the day shift and eight for the night shift, miners to receive \$3.25 per shift. This offer was made the day the men quit work several weeks ago and refused. It was renewed a few weeks ago and is now accepted by the Miners' Union. This may be taken as an indication that the union is now prepared to meet the owners half way. The Cripple Creek camp will probably be active again at a very early day.

The Bland Seigniorage Bill.

The Bland bill for coining the silver seigniorage and other bullion, which now awaits President Cleveland's signature, provides as follows:

SECTION 1. That the Secretary of the Treasury shall immediately cause to be coined as fast as possible the silver bullion held in the Treasury purchased under the act of July 14, 1890, entitled "An act directing the purchase of silver bullion and the issuing of Treasury notes thereon, and for other purposes," to the amount of the gain or seigniorage of such bullion, to wit: The sum of \$55,156,681, and such coin of the silver certificates issued thereon shall be used in the payment of public expenditures, and the Secretary of the Treasury may, in his discretion, if the needs of the Treasury demand it, issue silver certificates in excess of such coinage; provided, that said excess shall not exceed the amount of the seigniorage as herein authorized to be coined.

SEC. 2. After the coinage provided for in the first section of this act, the remainder of the silver bullion purchased of said act of July 14, 1890, shall be coined into legal tender standard silver dollars as fast as possible, and the coin shall be held in the treasury for the redemption of the Treasury notes issued in the purchase of said bullion; that as fast as the bullion shall be coined for the redemption of said notes the notes shall not be reissued, but shall be canceled and destroyed in amounts equal to the coin held at any time in the Treasury derived from the coinage herein provided for, and silver certificates shall be issued on such coin in the manner now provided by law; provided, that this act shall not be construed to change existing law relating to the legal tender character or mode of redemption of the Treasury notes issued under said act of July 14, 1890. That a sufficient sum of money is hereby appropriated to carry into effect the provisions of this act.

ARTICLES of incorporation have been filed in this city by the Consolidated Copper and Quicksilver Mining Company. The purpose of said corporation is to buy and sell copper and quicksilver mining claims, etc. Capital stock \$1,000,000, of which \$50,000 have been subscribed. Richard Phelan has subscribed \$10,000; J. T. Wilson, \$10,000; Fred Gottfried, \$10,000; R. M. Spencer, \$10,000; Albert Bachman, \$10,000.

Hard Times and Good Prospects.

TO THE EDITOR:—Business is dull in San Francisco. It is more or less so in other places, but other places make some effort to remedy the trouble. They don't sit down in sackcloth and ashes and mourn, nor did San Francisco in times past. It remains for the present generation of California and their companions, the late arrivals, to do most of the weeping and wailing. They have concentrated their wealth, energy and enterprise in and around San Francisco, and have got their business into a sort of pot hole and can't get it out. They dare not trust their capital beyond the corporate limits of the city and county, and hardly there. In olden times, when business was dull in the city and there was a surplus of labor, the crowd would rush to the mines, where they were pretty certain to make a living if not to make a big strike. Let those of the present population, who can, do the same, but in a slightly different way. They are not all miners, nor do many of them wish to become working miners. It is not necessary that they should; but they can become interested in mines, and furnish the money to open them so that our surplus labor can be employed.

The times are favorable for the development of our California gravel and quartz gold mines, there being plenty of unemployed miners ready and willing to work at reasonable wages, and the mining industry seems to offer a better field for the investment of capital than any other industry at present. Along the western slope and summit of the Sierra Nevadas, from the Mexican to the Oregon line, within our State, are innumerable gold-bearing gravel beds and quartz veins, large and small, showing gold in fair quantities. Many of these have been worked for a generation, supporting the owners and their families, perhaps not in the height of luxury, but often comfortably. On most of the quartz veins but slight depth has been attained, owing to the lack of sufficient money for their proper development. Interests in these mines or prospects can be secured, or they can be purchased at low prices, and are sufficiently promising and extensive to warrant the formation of companies or partnerships to furnish the necessary capital to prosecute further work, with a great degree of profit to the investors.

What better use could much of the idle capital of San Francisco be put to, and what better chance is there for making money than in opening up some of those or similar mines? San Francisco has been sending coin by the million to Nevada and other neighboring States and Territories to pay for the development of mines. Far-off hills have always looked the greenest to San Franciscans, while she has neglected just as good and many better and easier opened prospects and mines at home. If but a small percentage of the possibly good mines of this State were opened, or were now in course of development, there would be fewer unemployed men in this city and much better times throughout the State. In San Francisco the provision dealers would be furnishing the necessary supplies to the mines and miners. The foundries and machine shops would be working overtime. All other industries would be flourishing and prosperous and the people happy instead of poor and discontented. The merchants and manufacturers have lost much of the trade with adjoining States and have done next to nothing to encourage their own State mining industry, when by doing so they would have created new demands for their goods and ensured prosperity in business for themselves.

Where mining, either in gravel or quartz, has been conducted with honesty, economy and determination, with common sense added, it has been reasonably successful—as much so as farming, orchard or vineyard enterprises. Mining in California produces, under unfavorable circumstances, over \$10,000,000 per annum, and has been the only really profitable industry that California has known. It is capable of indefinite extension and can be made so as to employ all the men who can be induced to come to the State, if our own people will furnish the money necessary for a good start in developments. The field is large and can be worked profitably—I don't mean the Panzer alley or Pine street kind of mining, a kind that has done more to injure legitimate mining than has anything else. What I mean is actual, honestly conducted mining for gold—a product which finds a ready market and is not affected by overproduction, high freight or tariff reform.

If our capitalists, property owners, manufacturers and merchants wish to see the population drift away from our city and State, the value of their lands depreciate, their buildings vacant and the few remaining manufactories closed, a good way to bring about such a result is for them to keep their money in San Francisco, so they can see it all the time; and some of them can live on the rents or interest paid, others on their profits from wheat, fruit and vine—when they pay. Let them fossilize, so to speak, while the mining wealth of our State remains for wiser and more enterprising men to develop, and for a broader-minded generation to enjoy. It would, however, be much better

for themselves and for all hands if our capitalists, great and small, would wake up, brush the cobwebs from before their eyes, and lend a helping hand in the development of our mines. By so doing, the reality they now possess would increase in value, population would crowd to our State, as in days gone by, trade would be brisk, and California regain her reputation for push, enterprise and prosperity. It would be much more reasonable to contribute capital for the employment of labor to prospect and open up paying gold mines, safer and more creditable to our State, than is now being done in giving money to pay the "unemployed" for doing work which brings no profit and develops paupers.

Let those who cannot go to the mines, as in the olden times, invest a portion of their money in them, or, in other words, "put up" for the expenses and send partners or substitutes they can trust to do the work, while they themselves enjoy much of the profits.

Remember that the greatest part of all the gold that is taken out of our mines comes to San Francisco.

SCRATCH G. RAVEL.

San Francisco, March 20, 1894.

Work in the Slocan District.

The principal mines of the Slocan country, 15 in number, now give employment to about 250 men and they are taking out 100 tons of high-grade ore per day, according to a recent estimate in the Kootenai Herald. A correspondent of that paper, who has carefully compiled his data, believes that there is a similar number doing assessment work and developing smaller properties. He furnishes data of the work of the biggest claims, from which the following is taken:

	No. Employees.	Ounces Silver.	Per cent Lead.
Slocan Star.....	20	120	65
Noble Five.....	54	200	....
Washington.....	45	155	70
Mountain Chief.....	21	130	70
Dardanelles.....	20	300	28
Antelope.....	5	100	50
Freddie Lee.....	23	160	....
Northern Belle.....	25	160	60
Surprise.....	12	229	....
Blue Bird.....	10	144	71

The Slocan Star, it is claimed, has a contract with the Canadian Pacific railway to furnish 500 tons of ore, which is now being stored at Three Forks. The Noble Five expects to have 1000 tons on the market before the sleigh road breaks up. The Mountain Chief is storing ore at Three Forks, to await the coming of the railroad. The Dardanelles and Antelope are shipping ore to Tacoma. The Freddie Lee is shipping to Montana. In all, it is estimated, 4000 tons, valued at \$600,000, have been shipped since the discovery of the camp.

The South African Situation.

Extract from a Private Letter to a Mining Man in Seattle.

JOHANNESBURG, South Africa, January 22, 1894.—I will write you a few lines to let you know I am still alive. I am foreman in a mine. My pay is \$75 per month; board, \$25 per month, without bed. This is no country for a white man. Negroes do all the hammer and drill work. Their pay is 62 cents per day. There are 50,000 of them working within thirty square miles of here. There are 1500 stamp mills in one line of fifty miles. Each mill has from ten to one hundred stamps. The rock is low grade, assaying from \$3 to \$15 per ton. It is sulphurets and requires the McArdie process. The ledges have been prospected by diamond drill 2000 feet deep, and the rock is the same all the way down. This is a prairie country. The soil is red sand, and very poor. It will not produce without water. The Dutch Boers are an ignorant, lazy people. There are between 70,000 and 80,000 of them in the Transvaal republic. The negroes are worth nothing here. You can buy a good strong buck for \$100.

I will leave this country as soon as I can earn money enough to get away. There are a great many American miners here out of employment. Africa is no place for a tradesman or laborer.

T. R. BRAZILL

ANY abandoned lode, vein or strata claim may be relocated, and such relocation shall be prospected by sinking a new discovery shaft and fixing new boundaries in the same manner as provided for the location of a new claim; or the locator may sink the original discovery shaft ten feet deeper than it was at the time of its abandonment, and erect new or adopt the old boundaries, renewing the posts if removed or destroyed. In either event, a new location stake shall be fixed. The location certificate of an abandoned claim may state that the whole or any part of the new location is located as an abandoned claim.

The Red Point Drift Gravel Mine.*

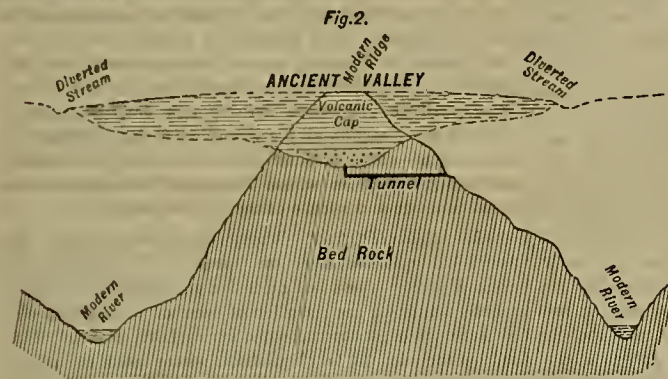
By C. F. Hoffmann, Mem. Tech. Soc'y.

In Three Parts.—Part III.

DISCUSSION.

Before reading the paper Mr. Browne said:

The drift mine of which Mr. Hoffmann's paper treats, is in one of the ancient river beds of the westerly flank of the Sierra Nevada. These are found in a striking topographical position, occupying the summits of the modern ridges, high above the present streams. This apparently anomalous position is due to the displacement of the ancient streams by lava and mud flows from volcanic eruptions in the high Sierra. These flows filled the old river beds and diverted the streams, which cut new beds to gradually greater and greater depths, leaving eventually portions of the gravels of the ancient rivers, with their volcanic caps, to form the modern ridges, as shown in the following cross section (Fig. 2).



The gold is contained mostly in the bottom layer of gravel under the volcanic cap. The method of mining is by driving a tunnel in from the hillside to tap the bed and drain off the water, and to serve as a tramway for delivery to the surface. The auriferous gravel is excavated, carried to the surface, and dumped on to a sloping floor at the mouth of the tunnel, and washed thence through a line of sluices, provided with riffles to catch the loose particles of gold—the gold dust.

Much of the data furnished by Mr. Hoffmann cannot be found in a published form, and is of special value to engineers in making estimates for similar enterprises.

After reading the paper Mr. Browne added: Aside from the figures giving working results, Mr. Hoffmann has observed several occurrences which I have not heretofore heard described, and which appear to me as having special interest. These are particularly: the poverty of the gravel where the boulders are coated with microscopic crystals of quartz; the effect of the strike of the natural riffles relatively to the course of the river in determining the position of the pay streak; and the greater the purity of the gold where large quantities of percolating water were encountered in the gravel breast.

This latter observation indicates that the gold particles have undergone a slow process of purification by prolonged washing.

There is no doubt in the minds of those most familiar with the occurrence of auriferous gravels that the gold dust was derived from the degradation of the gold-bearing quartz veins. But it is a matter of common information that the placer gold is purer than the gold in the quartz veins, and this fact gave rise to disputes concerning its origin. It was asserted by some theorists that the greater purity showed a difference in origin. However, the evidences of the derivation of the placer gold from the quartz veins are conclusive, and it remains only to explain the greater purity. I have for some time past been collecting information on this subject, and find the following averages from a large number of our California mines: Gold taken from placers, .890 fine; from quartz veins, .820 fine. The other constituents are mainly silver, partly baser metals.

The theory has been advanced that the silver and baser constituents when exposed to the action of the air and water are partially oxidized and dissolved, while the gold remains unaltered. In this way there results a purification of the outer film. The aggregate effect on the fine particles would be greater than on the large nuggets, and in fact the greater purity of the fine dust and of the outer films of nuggets is well known to dealers in placer gold.

Mr. Hoffmann tells me that, in the Red Point mine, in passing from a comparatively dry into a very wet section the purity of the gold dust always increases, generally from

.003 to .005, or say one-half per cent. Though something of the sort might have been anticipated, it is the first time I have heard of its being actually observed.

MR. MANSON.—Aside from the technical interest that the mining engineer would take in this paper, there is a great deal in it and in Mr. Browne's explanation of the occurrence of these two sets of river channels and the obliteration of one set with the lava overflow that interests the geologists.

I have had occasion to examine the western slope of the Sierras from a few dozen miles south of the point so interestingly described in this paper, to Mt. Shasta, and the western slope of the Rocky mountains in eastern Washington, Idaho and Montana. In that area, embracing parts of California, Washington, Oregon, Idaho and Montana, there are about 150,000 square miles, which are or have been covered with lava. Toward the northern edge, up in Montana, Idaho and Washington, the lava is from half a mile to a mile and a half thick, and is of dense basalt. Toward the southern edge or limit it appears to have degenerated, or certainly decreased in hardness as well as in thickness, and in some instances it is a mud lava that can be picked and handled without any very great trouble. In the Sierras the first set of river channels appears to have been formed during the period of denudation that followed that upheaval.

The denudation of portions of the Sierras amounts to about two miles in thickness, and in some instances to more. As that two miles was denuded from the western slopes of the Sierras, which was a line of lighter crust in process of upheaval, the amount of denudation lightened the load upon the crust and destroyed the state of isostatic equilibrium that the crust is always in. This caused the crust to upheave more. The denuded materials transported down the sides of the Sierras by water and gravity were deposited in the great valley of California, and this already in process of sinking was more heavily loaded. The additional load on the sinking area caused it to settle still farther; so that denudation acted in a double way to accentuate the difference of elevation between the valley and the mountains—that is, the continuous denuding of the one caused the building up of the other. At the same time, the process caused the valley to settle more and the mountains to upheave to a greater extent. Toward the latter part of the Tertiary, and probably running well into the Quaternary period, the process of denudation seems to have been interrupted by this lava flow, as Mr. Browne described, and a new set of river channels started in. In most instances these ran across the others, and in the modern rivers the richest deposits have been found just below where they had cut through the ancient river channels, the gold in the modern channels being the result of a double set of concentrations, first in the denudation and filling up of the ancient river channels, and finally in being reconcentrated in the modern rivers, leaving the enormously rich deposits that the forty-niners worked with such good results.

I regard this paper as an exceedingly valuable one, because it describes mining as a business enterprise. Mining in the early days, and even up to 1877, was largely a gambling operation; after the mine was located, the stock was put on the market, and it made but little difference whether the mine was valuable or not. So the mines were not systematically worked, and in many of the old river channels there are wonderful deposits yet; and I believe that the mining engineer and the geologist have before them a field of wonderful fertility in following up these river channels not only in the high Sierras, where they are covered by the lava caps, but by following them down into the plains below the level of the present alluvial surface of the valleys and also in the drift mines well under the surface of the present rivers. And I believe that this is going to be a line of mining which will be followed very largely in this country, and that projects of this nature will ultimately prove very attractive to capitalists.

MR. STRIEDINGER.—Mr. Hoffmann's paper fills, in a masterly manner, a long-felt gap in the literature on gravel mining. How thoroughly and economically the exploitation of the Red Point drift mine is carried on under his superintendence is shown by this abstract from his reports.

Mr. Browne has not mentioned the fact that he and Mr. Hoffmann executed the original survey of this mine, and subsequently located the tunnel, which, by crossing the ancient river channel about 20 feet below its deepest point, causes a perfect drainage of the underground workings. There are very few drift mines which are so well laid out.

Drift mines are not confined to the Pacific Slope of our Sierra. Not quite a year ago I discovered some drift

mines on the westerly foothills of the Andes, near Barbaçoas, Republic of Colombia, S. A. Drier drift mines than the "Red Point" are usually opened by means of inclined shafts with drifts extending from their bottoms.

MR. BROWNE.—The deep drain tunnel is necessitated by the amount of water contained in the channel. In the Red Point this amounts to 35 or 40 miner's inches, in the Mountain Gate and Hidden Treasure to 40 inches each, in the Mayflower, farther down the ridge, to 75 inches. If mined through deep shafts the handling of such quantities of water would eat up the profits.

There are a series of drift mines in the Harmony ridge, near Nevada City, however, where the gravel is almost dry, and the work there is most profitably carried on, as stated by Mr. Striedinger, through inclined shafts. The advantage of the inclined shaft is that it is shorter, and it may be run down on the rim rock until the bottom is reached, and it is not necessary to rely upon a vague estimate of the depth or position of the channel bed, as might be the case in driving a tunnel. But it should be borne in mind that every miner's inch means about 70 tons of water per 24 hours, and that the expense of lifting a very few inches will often amount to more than the expense of hoisting the total amount of gravel extracted. For example, the Mayflower mine delivers about 140 tons of gravel per day, and there runs through its drain tunnel nearly 40 times this weight of water.

Side Lines and End Lines.

The text of the decision of the United States Supreme Court in the case of *Silas F. King vs. the Amy & Silver-smith Consolidated Mining Company*, on appeal from the Montana Supreme Court, has been received. The opinion of the court is by Justice Field. It is of much importance, and it is herewith given practically in full.

The plaintiff and defendants are owners, as tenants in common, of certain mining property in Silver Bow county, State of Montana, known as the Non-consolidated lode mining claim. The plaintiff owns three-fourths of the claim and the defendant one-fourth. The defendant is, besides, the sole owner of the mining claim situated in the same county and State, known as the Amy lode mining claim. Both claims are located and patented under the mining laws of the United States contained in Sections 2320 and 2322 of the Revised Statutes. The Amy claim was first located and has the earlier patent.

The relative positions of these two claims are seen on the diagram in the record, which shows the course of the vein in the Amy claim upon which its location was made and the boundaries of the two claims, with the length and direction of each. The description of the two claims can be understood only by reference to the diagram, as each line is given. A copy of the diagram is here produced, as without it the description will be unintelligible to the reader.

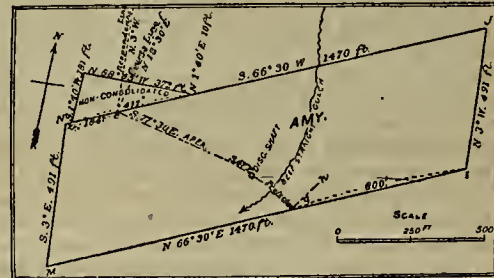


DIAGRAM OF THE AMY AND NON-CONSOLIDATED CLAIMS.

The Amy claim has a surface length of 1470 feet, and its side-lines are parallel. The end-lines are each 491 feet, and they are also parallel. The surface location forms a parallelogram of 1470 feet running easterly and westerly, by 491 feet running northerly and southerly.

The Non-consolidated claim lies adjoining the northwest corner of the Amy claim. Its surface shape is that of a triangle, the longest side of which joins the northerly side of the Amy claim, and, commencing 17 feet from the northwest corner of the latter, extends easterly 411 feet in length. Its northerly side-line, commencing (on the northerly line of the Amy) at the point where the first line terminates, runs in a northwesterly direction 372 feet to the point where it meets the westerly line of the lode, and extends southwesterly from this point 181 feet to the place of beginning.

The vein of the Amy claim, on its course or strike, passes through its northerly side-line, as marked on the diagram, into the Non-consolidated ground; its apex crosses that line 184 feet easterly from the west side-line of that claim, and does not again enter the Amy claim. The apex of the vein enters the south side of the Amy claim at a point within 600 feet westerly from the southeast corner of the Amy, and the dip of the vein is to the north.

The plaintiff has brought this action for a partition of the

*The accompanying paper, of which an abstract was printed in the Press on Jan. 13, 1894, is a most important contribution to literature on the subject of drift mining. In response to numerous inquiries, and by permission of the Technical Society of the Pacific Coast (before which the paper was read), the full text is given.

Non-consolidated claim with the defendant, according to the respective rights of the parties, if that be possible; but if the property cannot be thus partitioned advantageously, then for a sale of the premises and a division of the proceeds among the owners, in conformity with such rights.

As stated above, the vein of the Amy, of which the apex lies within the surface lines of the claim, in its course passes through the northerly side-line, and enters the Non-consolidated claim; and it is alleged that the vein has been there worked by the owners of that claim and valuable ore taken therefrom. The plaintiff, therefore, prays, in addition to a partition or sale of the Non-consolidated claim, for an accounting for his share, as tenant in common of an undivided three-fourths of that claim, of the ores taken from the underground workings of the vein of the Amy after it had passed into that claim, if any there were.

The defendant admits co-tenancy in the Non-consolidated claim with the plaintiff, but denies the taking of any ore from the vein of the Amy after it had passed into its ground.

The first question for determination is whether the Amy retained any right to the vein, the apex of which was within its surface lines, after it had passed through its northerly side-line, or, rather, through the vertical plane running down that line. If the Amy retained its right to that vein after it had entered the ground of the Non-consolidated claim, it belonged to the defendant as sole owner of the Amy, and he could not be called on to account to the plaintiff for any portion of the ores taken from it. If, on the other hand, the Amy did not retain its right to that portion of the vein after it had passed into the Non-consolidated claim, it became a part of that claim, and the proceeds of the ore there taken from it would, with other proceeds of the Non-consolidated claim, be the subject of an accounting between the plaintiff and the defendant, the owners, as tenants in common of that claim. The answer to the question must be found in the construction given to Section 2322 of the Revised Statutes, which took effect December 1, 1873, and which provides that locators "shall have the exclusive right of possession and enjoyment of all the surfaces included within the lines of their locations, and of all veins, lodes, and ledges throughout their entire depth, the top or apex of which lies inside of such surface lines extended downward vertically, although such veins, lodes, or ledges may so far depart from a perpendicular in their course downward as to extend outside the vertical side-lines of such surface locations. But their right of possession to such outside parts of such veins or ledges shall be confined to such portions thereof as lie between vertical planes drawn downward as above described, through the end lines of their locations, so continued in their own direction that such planes will intersect such exterior parts of such veins or ledges."

The preceding section (2320) prescribes the extent to which mining claims upon veins or lodes of quartz, or other rock in place, bearing gold, silver or other valuable deposits on lands of the United States, may be taken up after May 10, 1872. It allows a claim to be located to the extent of 1500 feet along the vein or lode, but provides that no location shall be made until the discovery of the vein or lode within the limits of the claim located, which is, in effect, a declaration that locations resting simply upon a conjectural or imaginary existence of a vein or lode within their limits shall not be permitted. A location can only rest upon an actual discovery of the vein or lode. The section also declares that no claim shall extend more than 300 feet on each side of the middle of the vein at the surface; nor shall any claim be limited by any mining regulation to less than 25 feet on each side of the middle of the vein at its surface except as prevented by adverse rights existing on May 10, 1872, and that the end-lines of each claim shall be parallel to each other. A claim located in conformity with the provisions of this section would take the form of a parallelogram, if the course or strike of the vein or lode should run in a straight line; but such veins and lodes are often found upon explorations to run in a course deviating at different points from such line. And from this circumstance much difficulty often arises in determining the lateral rights of the locators.

Section 2324 of the Revised Statutes recognizes the power of miners in each mining district to make regulations not in conflict with the laws of the United States, or of the laws of the State or Territory in which the district is situated, governlog the location, manner of locating and amount of work necessary to hold possession of a mining claim, subject to the requirement that the location must be distinctly marked on the ground so that its boundaries may be readily traced. It is evident from the provision cited that the location as made and defined must control not only the rights of the claimant to the vein or lode within its surface lines, but also any lateral rights.

Section 2322, cited above, declares that the locators of all mining locations shall have the exclusive right of pos-

session and enjoyment of all the surface included within the lines of their location; and also the exclusive right of possession and enjoyment of all veins, lodes and ledges throughout their entire depth, the top or apex of which lies inside of such surface lines extended downward vertically, although such veins, lodes or ledges may so far depart from a perpendicular in their course downward as to extend outside the vertical side-lines of said surface location. The surface side-lines, extended downward vertically, therefore determine the extent of the claim, except when in its descent the vein passes outside of them, and the outside portions are to lie between vertical planes drawn downward through the end-lines.

The difficulty in the present case arises from the course of the vein or lode upon which the Amy location was made. It is evident that what are called side-lines of the location, as shown in the diagram, are not such in fact but are end-lines. Side-lines, properly drawn, would run on each side of the course of the vein or lode, distant not more than 300 feet from the middle of such vein. In the Amy claim, the lines marked as side-lines cross the course of the strike of the vein and do not run parallel with it. They, therefore, constitute end-lines. It is true the lines are not drawn with the strict care and accuracy contemplated by the statute, and which could only have been done with more perfect knowledge of the true course or strike of the vein from further developments. But, as was said by this court in *Iron Silver Mining Company vs. Elgin Mining Company* (118 U. S. 196, 207): "If the first locator will not or cannot make the explorations necessary to ascertain the true course of the vein, and draws his end-lines ignorantly, he must bear the consequences." The court cannot become a locator for the mining claimant and do for him what he alone should do for himself. The most that the court can do, where lines are drawn inaccurately or irregularly, is to give to the miner such rights as his imperfect location warrants under the statute. It cannot relocate his claim and make new side-lines or end-lines. Where it finds, as in this case, that what are called side-lines are in fact end-lines, the court, in determining his lateral rights, will treat such side-lines as end-lines and such end-lines as side-lines; but the court cannot make a new location for him, and thereby enlarge his rights. He must stand upon his own location, and can take only what it will give him under the law.

Acting upon this principle there is no lateral right to the holder of the Amy claim by which he can follow its vein into the Consolidated claim. Mistakes in drawing the lines of a location can only be avoided, as said in the case cited, by postponing the marking of the boundaries until sufficient explorations are made to ascertain as near as possible the course and direction of the vein. "Even then," the court added, "with all the care possible, the end-lines marked on the surface will often vary greatly from a right angle to the true course of the vein, but, whatever inconvenience or hardship may thus happen, it is better that the boundary planes should be definitely determined by the lines of the surface location than that they should be subjected to perpetual readjustment according to subterranean developments subsequently made by mine workers. Such readjustments at every discovery of a change in the course of the vein would create great uncertainty in titles to mining claims."

Applying this doctrine to the case before us, it follows that the vein in controversy, the apex of which was within the surface lines of the Amy claim, did not carry the owner's right beyond the vertical plane drawn down through the north side-line of that claim. The Amy claim has no lateral right by virtue of the extension of the vein through what was called the north side of its claim, as that side-line, so called, was in fact one of its end-lines.

The judgment of the Supreme Court of Montana should therefore be reversed and judgment entered in favor of plaintiff for a decree of partition of the Non-consolidated claim between the parties to the suit, who are owners as tenants in common, provided such partition can be made with due regard to the respective rights of the owners; and if it cannot be thus advantageously made, that the premises be sold and the proceeds divided according to their respective rights; and further, that the respective parties render an account of the proceeds received by them, respectively, from the Non-consolidated claim, and that such proceeds be divided between them according to their respective rights.

Oregon Mining Districts.

Abridged from letter of Prof. Leigh Harnell to Portland *Oregonian*.

A great revival in our mining industry has set in earnestly, bringing with it fortunately such men and such capital as will certainly make it both profitable and permanent. I am speaking principally of placer mining in southern Oregon, where I am most familiar with the revival as it shows itself at present by an increased occupa-

tion of territory and the introduction of improved methods of working to make the occupation profitable. A person unfamiliar with the facts could scarcely realize the improvement in these respects during the last year. Take, for instance, the main South Umpqua, with Canyonville for its trading center and Riddles for its railroad center. A year ago there was not a single mining location on the river proper above Canyonville, and to-day for 30 miles it is covered with locations of great value and covering an immense area of good pay dirt on both sides of the river. By the owners of prominent locations, great efforts are being made to obtain sufficient water from the river and tributary streams for effective hydraulic mining, and these efforts will soon be accomplished. The prospect of a general remunerative pay is thoroughly established. In this section, outside the immense gravel beds in the bars and benches stretching far back from the river, all carrying gold in paying quantities, is found a large deposit of rich black sand, which in the property of the South Umpqua Mining Company assays from \$800 to \$1800 a ton, which can all be easily saved in what is called an undercurrent in mining parlance. This property is under bond to New York parties for \$100,000, and will most probably be sold next May. It will form an excellent advertisement for our State. All this new-born activity and enterprise—for it exists in every section all the way down to Jacksonville, 250 miles south—wherever possible or practicable, is cheering and hopeful to those whose lives have been spent in the dread solitude and silence of the old primeval hills.

The Olalla District.—Then, turning north from the South Umpqua river over the range of hills forming its present course, a new but extensive gold-bearing district is rapidly attracting the attention of men of means, and will be extensively prospected when spring fairly sets in. This section includes the Olalla district, where gold in paying quantities has long been known to exist, and extends north to within a few miles of Roseburg. The whole section is well watered, needing, for good work, only small and cheap ditches from one to four miles to bring water to the main gold flow. It has also the special advantage of being only $2\frac{1}{2}$ miles from the Southern Pacific Railroad—a very important advantage in the transportation of supplies and machinery to the mines. An effort was made last summer by Col. James Virtue and colleagues to get a foothold in the Olalla district, but they were vigorously opposed by a woman who refused them right of way for a ditch through her ranch, and so the enterprise fell through. The new one I now speak of, however, cannot fail, for it is free in its surroundings from all adverse action by others. The property, 640 acres, all gold-bearing, is owned by Mr. Gove, the jeweler, and a Mr. Hughes of Portland. Both are men of means and intend to bring their new enterprise to a completion as soon as possible. Thus, it is pleasant to know our revival in mining affects all classes, and that we shall soon have a new and extensive gold-bearing district, known to be rich, added to the many others which, for over 200 miles in unbroken continuity, form the wonderful placer fields of southern Oregon.

The Original Gold Flow.—From the samples of gold from this new district shown me by Mr. Gove I am satisfied it comes easily in the direct course of the original gold-flow, which forms such a conspicuous feature of southern Oregon. When once acquainted with its characteristics it cannot be mistaken. From certificates given by the San Francisco mint, the South Umpqua gold is 957 pure out of 1000 parts, and coins \$22 40 to the ounce, which is about as pure as ever taken from the earth. This is very important to prospectors in reaching final success in mining, as the coinage to the ounce makes a vital difference in different places. Before the gold-flow of southern Oregon reached its present level on the Umpqua, by the detrition of ages, there is every evidence that in earlier times it fed this new field and its surroundings as far west as Myrtle creek. Investments of capital for its development are thereby rendered safer.

But the most prominent feature of our mining revival is the introduction of a new method of washing the bars and benches of our gold-bearing rivers. This is White & Co.'s mammoth steam hydraulic plant, mentioned in a late issue of the *Oregonian*, and now on its experimental trial at Hadley's bar, two miles below Myrtle creek. Mammoth is the correct word, for it is really mammoth in construction, mammoth in operation and mammoth in success. The idea of such application for mining comes to us from Tacoma, where Messrs. White & Co. used it very successfully in washing away a large hill of dirt to make a level space needed for business purposes. On talking with Dana, Albee & Walker, of Portland, who furnished the plant for Myrtle creek, I find 40 yards of dirt 9 feet deep and 5 feet wide were washed easily in four hours' work, with a result of 50 cents a yard. Whether that is superficial or square yards matters not, for in hydraulic diggings five cents a cubic yard means a big fortune. The saving

of the fine gold, say 75 per cent, depends not so much on the amount of dirt washed as the application of under-currents to the main flume carrying off the debris.

This plant altogether cost \$5000. The economy of this method is, therefore, as remarkable as its power and success. There are few places where a ditch can be cut at \$1000 per mile, and then, if the ground should not pay, the whole investment is lost and mischief is done all round. But in this case the plant can be easily and at little expense removed to another place that will pay, and so failure finally is impossible. In any business, I imagine, such a conviction will always secure capital. This enterprise, then, marks a new era in our mining history, and is just what we needed. To show the unimpaired real power of this plant, I may say that if the volume of water it furnishes were driven through a 2½-inch nozzle against an ordinary frame building of two stories, even at 100 feet distance, it would simply demolish the entire structure in a few minutes. From this its power in mining may be justly estimated.

The F. L. Bartlett Zinc-Lead Process.*

This process is used at Canon City, Colorado, for the treatment of argentiferous zinc-lead sulphide ores. The process in general consists in separating the zinc and lead by volatilizing them in the form of a zinc-lead fume, from which a marketable pigment is obtained, while the silver is left behind with the other non-volatile metals, and is collected in a copper matte. The process is based on the fact, discovered by Dr. Bartlett, that when silver-bearing zinc sulphide ores are burned and the zinc is volatilized, the amount of silver dragged off with it is much less than was previously thought to be the case. Two methods of treating the ores are adopted according to the proportions of zinc and gangue they contain. Those containing about 25 per cent or more are treated by the first method; those containing about 22 per cent of zinc or less, by the second.

The following are examples of ores actually treated at Canon City:

	Silver.	Lead.	Zinc.	Iron.	Copper.	Silica.
1.....	10 ozs.	30 per cent.	24	38	0	5
2.....	25 ozs.	18 "	25	10	0	18
3.....	4 ozs.	2 "	12	24	10	38
4.....	29 ozs.	15 "	28	13	6	12

The requisites for the process are: (1) Cheap flaming fuel, *e. g.*, bituminous coal. (2) An iron ore, either as oxide or iron pyrites, the latter being especially desirable, if it contains silver. (3) A copper ore containing about 3 per cent copper for the formation of the copper matte to collect the silver.

The ores containing 25 per cent of zinc and over are crushed to pass a 4-mesh screen, and are then mixed by an archimedian screw with an equal bulk of fine coal. The mixture is then moistened and charged in lots of 600 lbs. into a furnace, of which the grate consists of perforated plates, the charge being spread on the grate in a layer about 4 in. deep. Air is forced through the charge from below at a pressure of about 2 ozs. per square inch, and a sufficient quantity of air is also forced through openings in the sides of the furnace above the layer of the ore to prevent the formation of sulphuric acid with the hydrocarbon vapor. The burning is completed in about 4½ hours, when the charge, which has not been touched during the operation, is in the form of a sintered mass, ready to go to the blast furnace containing the silver and other non-volatile metals and some zinc. The sulphur is driven off, and all of the lead and most of the zinc is volatilized, being collected in the form of a fume, out of which the pigment is made.

Iron pyrites, when necessary for a flux, are charged into a somewhat similar furnace and treated in a similar manner, except that only enough slack coal is used to start the pyrites burning, their sulphur contents being sufficient to supply the requisite fuel heat, while a higher blast (4 ozs. per square inch) is used, the burning being completed in from three-quarters to one hour.

Sinter from the zinc ore is mixed with the burned pyrite, copper ore, fluxes and fuel in the requisite proportions, and is smelted at a high temperature in a water-jacketed furnace of a greater proportional length than that of the ordinary blast furnace. Most of the zinc left in the charge passes off in the form of a fume which is saved, while the copper matte which collects the silver runs into an outside crucible with the slag and is tapped from time to time.

The ores containing about 22 per cent of zinc or less are smelted directly in a special furnace with the proper mixture of copper ore, fluxes and fuel. This furnace is water-jacketed and has two rows of tuyers on each side, the upper ones being about ten inches above the lower. The lower blast is supplied under a pressure of about two pounds to the square inch, and is preferably a hot blast. The upper blast is cold and run under a light pressure.

The ore and fuel are fed together continuously in a thin layer from 12 to 18 inches deep. For fuel, a mixture of coke and coal screenings is used, amounting to one-quarter of the weight of the ore. The blast from the lower tuyers plays upon the bath of molten matte, scorifying it and volatilizing all the lead and most of the zinc, which pass off through the thin layer of the unmelted portion of the charge in the form of a fume. The upper tuyers deliver a blast at the top of the charge, thus serving to keep up the necessary combustion and preventing the condensation of the volatile compound rising through it. The copper matte which collects the silver, as in the first method, runs into an exterior crucible with the slag, and is tapped from time to time.

The matte contains as much as 65 per cent copper and 250 ounces silver per ton. The slag contains six to ten per cent zinc and from three-fourths of an ounce to one and one-half ounces silver per ton of ore treated, no lead and only a trace of copper.

The fumes from all the furnaces, consisting of the zinc, lead and other volatile elements, are drawn from into chambers by means of exhaust fans and then forced through iron cooling conduits into long bags hanging from the roof of a building at some distance from the smelters. The gases pass through the bags where the solid contents of the fumes are caught, and from time to time shaken down into cars and taken to the refinery. This is subjected to a low, red heat in a closed tube containing a screw, which keeps the material in constant motion. By this means, all the deleterious volatile elements are removed, and the product is a marketable white pigment containing from 35 to 40 per cent of oxysulphate of lead and from 55 to 60 per cent of zinc oxide.

Some ores lose silver heavily, and others hardly any, ores containing copper or iron pyrites losing much less than others. As much as 95 per cent has been recovered, but generally the salvage is between 70 per cent and 85 per cent. Theoretically, the loss of silver should be confined to that in the pigment, and that in the slag, *i. e.*, in the former about 1 oz., and in the latter 1½ ozs. or 2½ ozs. per ton of ore treated; but there is a variable loss somewhere between, which has never been discovered. (Later returns show the silver loss to be under 2 ozs. per ton of ore treated, while there was a gain in the lead and gold over the assay of the raw ore).

The cost of treating the ore at Canon City is from \$5 to \$10 (average about \$6), including the production of the pigment and matte. The price of slack coal delivered at the works is 50 cents per ton, the coal mines being near the works. The price of coke is \$5 per ton at Canon City.

The cost of a plant to treat 250 tons of ore per day, producing about 20 tons of pigment and 40 tons of matte, is \$250,000.

The Best Methods of Arranging Load and Draft in Hauling on Farm Roads.

A late number of the *Deutsche Landwirtschaftliche Presse*, the leading agricultural journal of Germany, publishes the report of experiments made under the auspices of the Agricultural Institute of the University of Leipzig, for the purpose of testing practically the correctness of the extremely divergent views on the most advantageous mode of distributing the load and applying the draft in the case of farm wagons.

According to theory, on a hard and perfectly smooth plane it makes no difference on which part of the wagon the load rests or the draft is applied; and experiments made under these conditions confirm the prediction. But in farm practice we have to do, as a rule, with road surfaces more or less yielding; and the difference in the size of the front and hind wheels adds a complicating element, since the latter are supported on a larger section of their circumference than are the smaller wheels. In the latter, moreover, axle friction is greater than in the larger wheels.

The consequence is that, supposing the load to be so distributed as to rest equally on the front and hind wheels, the former sink more deeply into a soft road surface, causing an increased resistance as compared with the hind wheels. It seems reasonable that in order to equalize the resistance between the two sets of wheels, the front wheels should be eased by every available means, the more as, in case the hind wheels track with the front ones, the latter have to "break the way" for both.

The experimental tests were made by means of a specially perfected self-recording dynamometer, by which not only the average draft, but also its variations from one moment to another were accurately shown. These automatic diagrams are specially interesting in that they show in the most striking manner the extent to which the wear and tear on the team is aggravated by the constant succession of jerks, and how important it must be to obliterate these jerks by some equalizing appliances before they reach the draft animals. The averages given in the tables below

were, of course, obtained by a proper discussion of these diagrams in connection with previously determined constants of the dynamometer; the results are expressed in kilograms of weight required to overcome the resistance, by draft. The wagon was, of course, specially selected for good construction; its weight was 1051.5 kilograms (2313.3 pounds). A team of steady oxen were used for draft, and comparative trials were made in every case between hauling on a common field (dirt) road and a stubble field.

The first set of experiments was made with a load of 1440 kilograms (3168 pounds) and without varying the ordinary attachment of the traces. The load was alternately put entirely on the front wheels, and then on the hind wheels, with the results as a given below.

	Field Road.	Stubble.
Load on the front wheels.....	73.8	466.0
Load on hind wheels.....	60.3	381.6

Calling the draft when the front wheels were loaded, 100 per cent, we obtain the following figures:

	Field Road.	Stubble Field.
Load on front axle.....	100.0	100.0
Load on rear axle.....	81.7	81.9

Trial set No. 2 was made on the following day under the same conditions, with a two-horse team instead of the ox team; the results were practically identical, showing in each case an advantage of from 10 to 13 per cent in favor of loading the rear wheels.

A third set of experiments was now made, including one with the load evenly distributed between the front and rear trucks, but with an increased weight, amounting to 1680 kilograms (3696 pounds). The results were:

	Field Road.	Stubble Field.
Load on front truck.....	112.5 kg.	368.1 kg.
Load evenly distributed.....	108.9 kg.	298.8 kg.
Load on rear truck.....	92.7 kg.	328.5 kg.

Or in per cents:

Load on front truck.....	100.0 per cent.	100.0 per cent.
Load evenly distributed.....	96.8 "	81.2 "
Load on rear truck.....	82.4 "	89.2 "

The divergent result in the case of the stubble field experiment and evenly distributed weight is attributed to the accidental choice of a comparatively dry ridge instead of the well-soaked lower ground. However, taking all the trials together, there can be no doubt of the material advantage of loading the front truck as lightly as possible.

The next points experimented on were the influence of the point of attachment of the draft, or traces, and that of the greater or less length of the latter.

One set of experiments, made to compare the results as between an ordinary field road and a regular driveway, gave the following percentage results:

	Field Road.	Driveway.
Attachment low, traces long.....	100.0	100.0
Attachment low, traces short.....	77.0 per cent.	81.9 per cent.
Attachment high, traces long.....	71.8	80.9 "

These measurements confirm the current assumption that short traces lighten draft, as derived from experience. That the difference is less on the smoother driveway than on the dirt road in the field also agrees with the assumption, since on a perfectly smooth surface there would be no difference; the effect of short traces being to facilitate the lifting of the load over the inequalities of the roadway.

As between the field road and the stubble field, the following percentage results were obtained:

	Field Road.	Stubble Field.
Attachment low, traces long.....	100.0	100.0
Attachment low, traces short.....	89.6 per cent.	90.0 per cent.

Trials were also made to determine the effect of attaching the draft at the end of the wagon tongue. The following table summarizes the results obtained on the stubble field:

Attachment low, traces short.....	298 kg. or 89 per cent.
Attachment low, traces short.....	311.4 " or 100 "
Attachment at end of tongue.....	339.3 " or 109 "

Other experiments showed this difference to be still greater when, in attaching the draft at end of tongue, the load was placed on the front truck.

While it is not pretended that these experiments settle definitely the several points, they serve to point out the directions in which advantages in lightening draft may certainly be gained; namely, by disposing the load as near as possible to the rear truck, and by using short traces. The fact that draft animals hitched to the end of the wagon-pole (as in teams of more than two) do not work as advantageously as the wheel horses hitched with short traces, though well recognized by the practice of using the strongest animals in the latter position, is now, for the first time, demonstrated by measurement.

Collaterally, this series of trials serves well to illustrate the importance of good, smooth roads, in which all these differences are reduced to a minimum and the best results can be obtained under greatly varied conditions, as they must unavoidably be in practice. It may well, therefore, serve as a text to those of our citizens who, of late, have manifested such an active interest in road improvement. —Prof. E. W. Hilgard in Pacific Rural Press.

*Abstract of a report by E. W. Hawker, F. G. S., for the Broken Hill Company of Australia.

Scientific Progress.

Alloy in Metals.

Exact alloys of metals are often difficult to make, and with many a very small quantity of alloy greatly affects their qualities and produces some peculiar and unaccountable phenomena in working the metal, says the *Scientific American*.

The presence of 1-2000 of an ounce of antimony per pound of lead increases the activity with which it oxidizes and burns in the melted state. Lead containing more than 1-1000 of an ounce of copper per pound is unfit for the manufacture of white lead, on account of its coloring properties. Gold, with an alloy of 1-2000 of its weight of lead, is extremely brittle. Nickel was regarded as a metal which could be neither hammered, rolled nor welded, until it was discovered that the addition of 1-1000 part of magnesium or of 3-1000 of phosphorus makes it malleable and weldable to iron and steel. One-twentieth of an ounce of iron to one pound of copper renders the copper hard and brittle. Copper containing 1-1000 of its weight of antimony or bismuth cannot be used for making rolled brass. Zinc mixed with copper to the amount of 1-10 of an ounce per pound makes the copper red short. One-sixth of an ounce of arsenic makes copper hot short, while $\frac{1}{3}$ of an ounce makes it cold short. Some of the copper of commerce, made from ores containing other metals, sulphur, arsenic and silicon, is sometimes the cause of serious trouble with manufacturers in the rolling and stamping of copper and brass goods.

The electric conductivity of copper is largely modified by small admixtures of other metals, as with one-half of one per cent of iron its conductivity is reduced 60 per cent, as also with varying alloys of other metals of low conductivity.

The remarkable addition to the strength of metals by the fractional mixture of alloy of other metals or substances is a notable feature of modern metallurgy.

Copper, having a tensile strength of 25,000 pounds, by an addition of six per cent of tin may be equal to 28,000 pounds, but with the addition of one to two per cent of phosphide of tin and copper its tensile strength is increased to 80,000 pounds or more per square inch.

The addition of aluminum to copper in the small proportion of one per cent, largely increases its tenacity, and at 7½ per cent aluminum is equal to 60,000 pounds, and a ten per cent alloy 90,000 pounds per square inch, the highest being a test at the Washington Navy Yard of 114,000 pounds tensile strength.

The minute fractional alloys of aluminum and nickel with steel, as well, also, as its constituents, carbon, sulphur, phosphorus and silicon, are well known and need not be repeated.

Soap Suds for Calming Waves.

The remarkable action of oil upon waves is well known, says *Nature*. This phenomena led the officers of the steamship Scandia, of Hamburg, to make an experiment upon the same principle that was very successful and that appears to us worthy of mention. During its last trip to the United States the vessel, while in midocean, was attacked by a very heavy storm. It then occurred to the officers to dissolve a large quantity of soap in tubs of water. Having thus obtained several hundred gallons of soap suds in a very short time, they threw it overboard in front of the ship. The effect was almost instantaneous, and the vessel soon began to navigate without difficulty. Her officers at once addressed a long report to the Hydrographic Bureau of the United States, giving an account of their voyage, the storm, and the means that they employed to still the waves. They conclude by saying that, although soap suds

do not produce absolutely all the effects upon water that oil does, it at least suffices to break the force of waves in most cases. Besides, this method recommends itself to transportation companies careful of their interests. Soap suds is much cheaper than oil, and a relatively large quantity of soap can be carried without encroaching too much upon the space set apart for passengers and merchandise.

An Idea.

TO THE EDITOR:—When the explorers toward the North Pole reach the last line known, the question which they address to one another is, What path are we now to engage in? Is it leaning toward the east or west longitude? and so forth and so on. They are reflecting, and, as people groping in the dark, they make their attempts, which so far have not helped them to discover a road to attain their aims.

I have an idea which, it seems to me, could be communicated to them: Have a photographic balloon, small in size, and captive, so that when having reached the highest iceberg it could take a picture of the surroundings. Then the explorers would know what is above the icebergs, which close to them the farther horizon. They would know whether land is near or that an extensive sea separates them from it. Then a picture of the color of the water should be taken, which would reveal to them the condition of the outward climate. Even if the pictures were a little confused, the explorers could trace the green of the land, or the blue or yellow or green of the waters, or the white of the ice. They would know what is above or on the other side of the icebergs, and from that knowledge direct their course.

The material with which to fill the balloon could be obtained from a fire made of straw, if they did not wish to carry gas with them. That the picture could not be produced before the proper height is attained, the balloon should be covered with divided cloth put upon a frame, both halves to be kept closed by a string running along the captive rope, and, when desired, the explorers could pull that string and the silk of the balloon would become exposed to the rays of the sun; and the picture, when made, being submitted to chemical preparations, would be instantly produced; then bringing it down, the explorers could study it and act accordingly.

Now for their comfort. Before starting on they should establish several provision stores along the road they intend to follow until reaching the last spot known, said stores to contain dry edibles, wine, whisky, and olive oil. The last precaution is very necessary; it is a preventive against irritation of the throat and lungs, and it lubricates the digestive organs and all their conduits. They should also have some white vaseline, to apply on the eyelids during the night, and what would go into the eye would be a help. Then some fuel, one or two skin suits and blank books. With all these, the explorers would not apprehend starvation, nor death from cold.

The photographic apparatus should be placed upon the floor of the circle surrounding the rope of the balloon, and a string attached to each covering would unite them, passing through a little ring fixed to the rope and descending along it to be again united at man's height to a simple ring hanging there, and, by means of two small rings, the explorers could pull it up and let go when the photograph was taken. Then all would be over and the balloon brought down. Why should not the rope be of thin wire? There should be one apparatus at each point of the compass—a kodak would, perhaps, answer the purpose.

Sausalito, Cal. MRS. J. H. TURNEY.

For Thermometers.

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Battle Ships and Monitors.

"Taking first the battle ships," says W. A. Dohson in the *Popular Science Monthly*, "we find them to be, of all the types of war vessels, the most powerful in the feature of offense and defense; they are intended to stand and fight, to give and take blows, like gladiators in a prize ring; and the reason can be plainly seen when we appreciate the fact that an enemy can bring his battle ship within twelve miles of our large seacoast cities, and there taking up a position of vantage, secure from any attack by land, shell the city; the only vessel, then, that can dispute possession with him, point by point, is a ship of similar powers of doing battle, however successful an attack by torpedo boat, either surface or submarine, may be when conditions are suitable. The points, therefore, to be emphasized in the design are protection and armament, or the power to deliver heavy blows with the ability to withstand those of its antagonist.

As a purely harbor-defense vessel the Monitor stands pre-eminent, the entire hull and battery being protected by armor, and at the same time offering such a small target that it is extremely difficult to hit; but its military value is very seriously impaired when in a seaway, by the short distance of the guns above the water, it being impossible to use them in a heavy sea. Perhaps the vessels most useful in all-around work are the armored cruisers, as they are intended to have great speed, great endurance, good capable of coping with vessels inferior only to battle ships, with a very considerable amount of protection afforded to the hull and armament; their function in war is to capture the commerce destroyers of the enemy, to act as commerce destroyers themselves, and to convoy and protect fleets of large and fast merchant vessels. To accomplish these purposes great speed is necessary, either to overtake or convoy swift merchantmen; great endurance of coal supply, to enable them to keep the sea for long periods on the path usually frequented by merchant vessels; and offensive and defensive power sufficient to enable them to successfully resist the attacks of vessels of their own class.

How Granite Columns Are Turned.

According to the census reports, granite for columns, balusters, round posts and urns is now worked chiefly in lathes, which for the heaviest work are made long enough to handle blocks 25 feet long and five feet in diameter. Instead of being turned to the desired size by sharp cutting instruments as in ordinary machines for turning wood and metal, granite is turned and ground away by the wedgelike action of rather thick steel disks, rotated by the pressure of the stone as it slowly turns in the lathe. The disks, which are six or eight feet in diameter, are set at quite an angle to the stone, and move with automatic carriage along the lathe bed. Large lathes have four disks, two on each side, and a column may be reduced some two inches in diameter the whole length of the stone by one lateral movement of the carriage along the bed. The first lathe is for turning granite cut only cylindrical or conical columns, but an improved form is so made that templates or patterns may be inserted to guide the carriages, and columns having any desired swell may be as readily turned. For fine grinding and polishing the granite is transferred to another lathe, where the only machinery used is to produce a simple turning or revolution of the stone against iron blocks carrying the necessary grinding or polishing materials. Blocks are prepared for lathe work by being roughened out with a point, and by having holes chiseled in their square ends for the reception of the lathe dog and centers. This principle of cutting granite by means of disks re-

volvied by contact with the stone has been applied to the dressing of plane surfaces, the stone worked upon being mounted upon a traveling carriage and made to pass under a series of disks mounted on a stationary upright frame.—*Mechanical News*.

Pumping Coal to Market.

There was something strikingly novel to most people who visited the last World's Fair in the notion of pumping a fuel supply to the power plant of that great show, from a point many scores of miles away. The marvel consisted, perhaps, more largely of the successful use of crude oil on so large a scale in feeding fires under steam boilers than in the mode of shipment. It has, however, been proposed to pump coal to market in a similar way. The *Engineering News* recently discussed such a scheme at length. This, obviously, is a more remarkable idea, for coal is a solid. But the inventor, W. C. Andrews, meets this difficulty by crushing the stuff and mixing it with water. It has been suggested that not merely the vast heaps of culm which are now going to waste in the mining regions, but the whole output of the mines, might thus be sent to the consumer, the great recommendation of the plan being its economy. Coal could be "pumped to market," it is affirmed, for one-tenth the cost of rail transportation, if there be a steady demand. Still another gain would be secured in the operation of mining were this system generally adopted, for then it would be unnecessary to avoid producing a large proportion of "slack" or culm.

The coal could be reduced to dust, according to some estimates, for from three to five cents a ton, and washed free from pyrites, slate and other impurities for five cents more. This latter process would leave it in a greatly improved condition and increase its market value. It would then, according to the plan under consideration, be mingled with its own weight of water, and thus be forced through pipes as easily as is oil. Coal being lighter than most other minerals and but little heavier than water, it would remain in suspension easily. Absence of grit would prevent erosion of the pipes, and nothing of value could be withdrawn from the coal by soaking. Moist coal, when exposed to the air, deteriorates rapidly and is liable to spontaneous combustion; but so long as the fuel is kept under water in settling basins, these drawbacks would not be experienced. And where the coal is not to be used immediately, it would be stored in this manner; then it would be stirred up again before pumping to consumers.

At best two things are requisite for the ultimate success of this scheme: A good way of disposing of the water eventually, and a satisfactory mechanism for burning coal dust. That this latter object will soon be attained, if it has not been already, there is much reason to believe, as a writer in the *New York Tribune* recently indicated. As for the fluid which is employed in transportation, Mr. Andrews would get rid of most of it by means of settling basins. Even with only 10 or 20 per cent of water, it has been estimated, the coal could still be forced through pipes for short distances, and various driers could then be devised to complete the work, if completion were desirable. But the *Engineering News* calls attention to a fact which possibly the original proposer of this idea had not thought of: If it were feasible to feed wet coal dust into a furnace, the cost of vaporizing the moisture therein would be small. A mixture of half and half, says the *Engineering News*, would involve a loss of only 8.5 per cent of the heat from good coal, and 11 from poor coal, whereas by the settling basins the proportion of water could be reduced from 50 to 10 or 15 per cent, and the heat loss reduced to 2 or 3 per cent. As yet it does not appear that any wholesale test has been made of this plan.

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Electricity.

The Cause of Trees Being Struck by Lightning.

The frequent striking of trees by lightning is a traditional phenomenon that is well known, but the causes of it are not so precisely known, although it is, in a manner, a primordial electric manifestation. Mr. D. Jonesco has recently made a series of interesting experiments on this subject, the results of which have been communicated by him to the Agricultural Society of Brabant, says *La Genie Civil*.

Mr. Jonesco has ascertained that certain trees attract lightning better than others. Starting from this, he has endeavored to find out how the various forest trees behave with respect to electric discharges, and has ascertained that the greater or less conductivity of trees should be taken so much the less into consideration in proportion as the electric tension is stronger. When the latter is sufficiently elevated, any tree may be struck by lightning; but differences exist from the moment that the tension is feeble. The richness of the wood in water, contrary to what is generally believed, has no influence upon the conductivity of the living wood for the electric spark. On the contrary, such conductivity depends much upon the richness of the wood in starch and oil. Mr. Jonesco, in accordance with Mr. A. Fischer on this subject, consequently distinguishes trees as oil trees and starch trees, and reaches the following conclusions:

The green wood of trees is in all cases a bad conductor of electricity, and so much the worse in proportion as the tree is richer in oil. On the contrary, the green wood of amyloseous trees, poor in oil, conducts electricity relatively well. Living wood is a much better conductor than dead. This existence of dead branches in trees of both categories, therefore, increases the danger of lightning. This is an observation of no small importance from the standpoint of the safety of houses situated in the vicinity of large trees. The cambium and bark are better conductors than the wood, but these parts are relatively to the bulk of the tree, too slightly developed to modify its electric conductivity. The latter, therefore, depends upon the wood only, since, according to Mr. Jonesco, the foliage is equally without influence upon the relative conductive power of trees for the electric spark.

The results of these researches are confirmed in the statistics given by Mr. Jonesco, and which consist in the observations made upon lightning strokes and trees since 1847 by the superintendency of forests of the principality of Lippe. It has been found, for example, that the oak is much oftener struck than the beech. Now, the first is a type of starch tree and the second a type of oil tree. On another hand, the observations made establish the fact that the frequency of lightning strokes is greater in the dry than in the other branches. Besides, the same statistics go to prove that the danger of lightning has no relation with the character of the soil. Although the highest figures are shown in hard and sandy ground, this is due to the fact that starch trees grow in such soil, but the nature of the latter is without influence.

The Purification of Lead by Electrolysis.

An ingenious application of electrolysis is being made in the purification of lead, and the recovery of silver from argentiferous lead which results in the production of chlorine, says London *Electricity*. The chlorides of calcium and magnesium are decomposed with lead nitrate, and the lead chloride so formed is utilized for the electrolytic production of chlorine, whilst the nitrates of calcium and magnesium, which are also the results of the decomposition,

are heated for the recovery of the nitric acid, which is used for dissolving fresh quantities of crude oxidized lead to form lead nitrate. Silver and other metals may be precipitated from this solution by the addition of spongy lead. As an alternative way of working, hydrochloric acid is used instead of the chlorides for decomposing lead nitrate (or acetate), the products being lead chloride and free nitric acid, which may be used as before for dissolving fresh quantities of previously oxidized lead. The fused chloride is electrolyzed in a glazed earthenware or enameled iron vessel, kept at a suitable temperature. The cell is closed on the top, and is provided with a feed pipe for the lead chloride, a chlorine outlet pipe, and a siphon for drawing off the purified molten lead. The carbon electrodes, alternately, anodes and cathodes are securely fastened on the lid. In another arrangement the carbon plates are all anodes, the molten lead forming the cathode. The conductivity of the carbon electrodes may be improved by making them with a core of iron or other metal in the form of a plain corrugated or perforated surface.

Relation of Heat to Electricity.

The effect of low temperature upon the physical properties of matter is very striking, says Prof. A. E. Dolbear in the *Cosmopolitan*. For instance, it is found that the vigor of chemical action decreases and the elements apparently lose their ability to combine as their temperature is lowered. Thus phosphorus and oxygen, which so energetically combine at ordinary temperatures, become more and more chemically inert as this temperature is decreased, until at 200° below the freezing point of water they appear to be unable to unite. This may be otherwise stated by saying that in the absence of heat there is no chemical affinity. Now, heat is known to consist in the internal vibratory motion of atoms and molecules of matter, so that it appears that in the absence of such vibratory motions there is no possibility of chemical action. On the other hand, as the temperature falls, the magnetic and electrical qualities of some, or all of the elements, are exalted in a proportional way. Thus, oxygen, which is feebly magnetic at ordinary temperature, becomes strongly magnetic at 200°; and when liquefied, as it easily may be at such low temperature, it behaves like iron to a magnet, and will adhere strongly to its poles.

At ordinary temperatures, copper is six times better a conductor of electricity than iron, but the conductivity of each is increased by cold. Copper is tentimes better as a conductor of electricity at 100° than it is at the freezing point of water, and the conductivity of iron increases at a still greater rate until iron becomes as good as copper. It has been proposed to inclose electric conductors in pipes to be kept very cold by some of the well-known processes for extracting heat, such as are in common use for ice production, as the amount of copper needed would be less as the temperature was less. It may be some time before this plan is carried out; but that it is possible to thus reduce the cost of electrical conductivity by running an engine to produce cold is certain, and it will be done when the cost of copper becomes commercially comparable with the cost of running an engine for such a purpose.

Experiment seems to indicate that all the metals are thus affected by cold, and that at absolute zero their electrical conductivity becomes infinite, or, as it is more generally stated, the electrical resistance of metals becomes zero. The other properties of substances are also profoundly changed so as to be radically different from what they are under ordinary conditions. Cohesion, tensile strength, malleability, etc., become less and less, so it seems altogether probable that the qualities and states of matter so

familiar to us as solids, liquids and gases depend absolutely upon temperature, and that at absolute zero there would be neither solid nor liquid nor gas, and that electrical and magnetic qualities would be at a maximum. This opens up a great field for speculation as to the nature of matter itself, when most of what we call its properties may be emptied out of it by simply reducing its vibratory motion.

Useful Information.

History of Matches.

The lucifer match has attained its present high state of perfection by a long series of inventions of various degrees of merit, the most important of which resulted from the progress of chemical science. Starting from the ingenious tinder box of our Saxon ancestors, the first attempt, so far as known, to improve on the old sulphur match was made in 1805 by Chancel, a French chemist, who tipped cedar splints with a paste of chlorate of potash and sugar. On dipping one of these matches into a little bottle containing asbestos wetted with sulphuric acid, and withdrawing it, it burst into a flame. This contrivance was introduced into England some time after the battle of Waterloo, and was sold at a high price under the name of Prometheans. Some time after this a man opened a shop on the Strand. It was named the Lighthouse. An ornamental open moiré metallique box, containing 50 matches and the sulphuric acid asbestos bottle, was sold for a shilling. It had a large sale and was known in the kitchen as the Hngh Perry.

Heurtner also brought out Vesuvians, consisting of a cartridge containing chlorate of potash and sugar and a glass bead full of sulphuric acid. On pressing the end with a pair of nippers the bead was crushed and the paste burst into flame. This contrivance was afterward more fully and usefully employed for firing the gunpowder in the railway fog signals.

We now come to Walker. He was a druggist at Stockton-on-Tees, and in 1827 produced what he called Congreves, never making use of the word lucifer, which was not yet applied to matches. His splints were first tipped with the chlorate of potash paste, in which gum was substituted for sugar, and there was added a small quantity of sulphide of antimony. The match was ignited by being drawn through a fold of sandpaper with pressure; but it often happened that the tip part was torn off without igniting; or, if ignited, it sometimes scattered balls of fire about. These matches were held to be so dangerous that they were prohibited by law in France and Germany.

The first grand improvement took place in 1833 by the introduction of phosphorus into the paste, and this seems to have suggested the word lucifer, which the match has ever since retained.

When phosphorus was first introduced to the match-maker its price was \$20 per pound, but the demand for it soon became so apparent that it had to be manufactured by the ton, and the price quickly fell to 60 cents per pound.—Exchange.

History of Iron Making.

Iron was used before history was written. The stone records of Egypt and the brick books of Nineveh mention it. Genesis (ix, 22) refers to Tubal Cain as "an instructor of every artificer in brass and iron," and in Deuteronomy (iii, 11) the bedstead of the giant Og was "a bedstead of iron." The galleys of Tyre and Sidon traded in this metal; Chinese records ascribed to 2000 B. C. refer to it; Homer speaks of it as superior to bronze. The bronze age came before the iron age, because copper, found as a nearly pure metal, easily fuses, and with another soft metal—tin or zinc—alloys into hard bronze; while iron, found only as an

ore, must have the impurities burnt and hammered out by great heat and force before it can be made into a tool. The word sometimes translated "steel" in our English Bible really means bronze or brass; but steel was distinctively known to the later ancients. Pliny the elder wrote in the first century of our era: "Howbeit as many kinds of iron as there be none shall match in goodness the steel that comes from the Seres (Chinese), for this commodity also, as hard ware as it is, they send and sell with their soft silks and fine furs. In a second degree of goodness is the Parthian iron."

Asia probably made more iron and steel 30 centuries ago than it does to-day. About the time of the first Olympiad, 776 B. C., there is authentic record of the use of iron in Greece, and Lycurgus used it for the money of Sparta. Iron and steel weapons of war began to displace those of bronze before the battle of Marathon. The Romans learned iron-making from the Greeks and the Etruscans—their mysterious and highly civilized neighbors—and obtained iron largely from Corsica, where the mines had been worked from the prehistoric period. The Roman legionaries found in Spain steel weapons of the finest temper, and Diodorus says that the weapons of the Celtiberians were so keen "that there is no helmet or shield which cannot be cut through by them." Toletum (now Toledo) was then as famous for its sword blades as afterward in the Middle Ages. Cæsar found the painted Britons fighting with spear-heads of bronze, but wearing armlets of iron, and remains of pre-Roman forges are still found in England and Wales. The Germans knew the art of sword-forging, and their legends of dwarfs and trolls with magic swords point to an earlier people, adepts in mining and metalurgy.—From "A Bar of Iron," edited by R. R. Bowker in Harper's Magazine for February.

Electric Canal Propulsion.

Electric propulsion on canals is not altogether so new a thing as those who read of the Erie Canal enterprise may have been lead to think says *Cassier's Magazine*. For some time past, in fact, electric power has been applied to identically the same purpose in France, on the Canal du Bourgogne, and illustrations which have appeared in several French papers of the electrically equipped boats there used, have shown the arrangement adopted to be similar in many respects to that only recently carried out in the United States. On the French boats, however, the electric motors are not coupled to the propeller shafts, but, instead, drive trains of gearing by which a chain on the bottom of the canal is clutched, thus pulling the boat along. Chain haulage of this general kind has long been in use on some of the European waterways, and, in itself, is nothing new, simply illustrating in this instance another example of electric development of an old method of propulsion. The double trolley system is employed, and the current is furnished by generators driven by turbines, the canal company controlling near-by water power which could be readily utilized.

Specific Gravity of Gas.

Herr Max Arndt, of Aix, has patented in Germany a curious method of finding the specific gravity of a gas. He counterpoises on a balance an inverted bell with a very narrow mouth, and into this he lets the gas whose specific gravity is to be ascertained. If the gas is lighter than air, the bell rises; if heavier, it sinks. The apparatus is so constructed as to draw air from the bell, as well as to let air into it.

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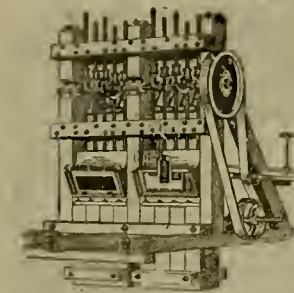
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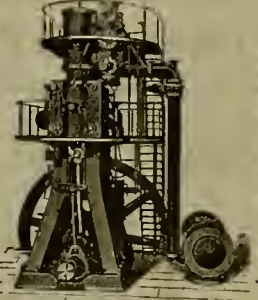
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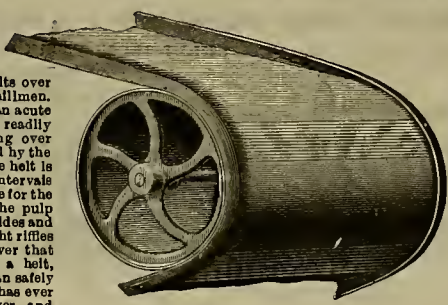
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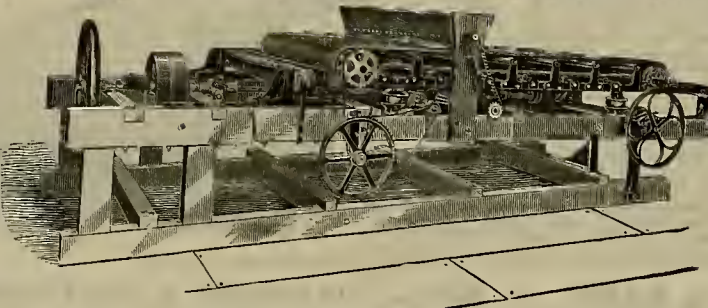
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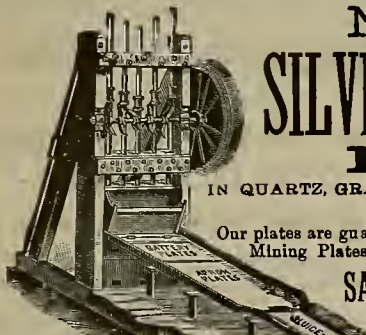


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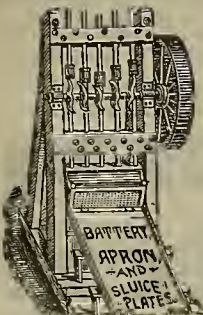
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Mining Summary.

The following is mostly condensed from journals published in the interior, in proximity to the mines mentioned.

CALIFORNIA.

Calaveras.

Very Rich Rock.—San Francisco Post: Henry G. Hanks, the well-known assayer of this city, has just completed the assay of some fabulously rich rock from the Carson Creek mines of Calaveras county. The ore which was taken from the incline now being run at a depth of about 400 feet from the surface goes \$33,000 to the ton, and all that the lucky owners are now interested in is the extent of the new find.

In speaking of this matter Mr. Hanks, who has the reputation of being one of the most careful and conservative men in the business, said that assays of the kind were apt to be misleading among people who do not understand mining. While this could be accepted as an indication of highly mineralized vein matter in places, it should not be supposed that the average of the ore extracted would run anything like this amount quoted. Enormously rich specimen rock has been taken out of this mine at times in the upper workings by former owners, and in adjoining properties, notably the Carson Hill and Morgan mines, "bunches" or "pockets" have at times been discovered, from which thousands of dollars were taken with a hand mortar.

The same can be said of a number of mines in Tuolumne county, which are now worked almost entirely for "pockets." In others, again, the ore contains a large amount of tellurium, and samples of the kind are now on exhibition at the Midwinter Fair which will run as high as \$26,000 to the ton. Many of these properties were abandoned years ago, owing to the lack of knowledge in regard to saving the gold in this particular class of ores, and were finally disposed of for a song to the present owners. Now, with the improved system in milling and reduction plants the former difficulties are overcome and very little of the metal in the ore escapes by volatilization or otherwise.

The Carson Creek property was formerly known as the Jones mine. It was worked with good results to a depth of about 240 feet on an incline. After laying idle for some years it was purchased by some Eastern capitalists, who have since expended considerable money in the work of development. They have carried the incline down from the old workings a distance of 460 feet, where the discovery has just been made which has attracted so much attention to the property. As soon as a station has been cut out drifting will begin to determine the extent of the new find.

The Carson Creek location only covers a claim of 20x800 feet, but the company also owns an extension covering 600x1000 feet, the ordinary sized claim under the State mining laws.

The improvements consist of a new 40-stamp mill, with all the latest improvements. The formation is granite and slate. The mine, which is located four miles by wagon road from Angels Camp, is well situated, being in the neighborhood of the Utica, which turned out over \$250,000 in bullion last month, and other mines of historic interest as gold producers.

Mono.

TAUVERTINA MARBLE.—The great travertine discovery within sight of the Bridgeport Chronicle-Union office is attracting much attention and becoming widely known, and the exhibit of this fine building material, of which ancient and modern Rome had and has splendid buildings built of it, and which is said to be the most lasting building material known, has, at the Midwinter Fair, opened the eyes of the marble men and builders of the country. The Carson News says that Mr. Lindsey, the owner of the quarry, has orders for five carloads.

In this great find Mr. Lindsey has something better than a gold or silver mine, as it is not liable to "peter out," the work of nature continually adding to the deposit which now seems inexhaustible. This deposit of travertine is the only known one on this continent, and perhaps in the world, outside of Italy, where the builders of Rome obtained this lasting and beautiful stone.

Nevada.

WILL PUT UP A MILL.—Nevada City Transcript: Sam Peck and Wells Ashman have been testing the cemented gravel found near Mrs. Storey's residence, off from Orchard street, and have concluded to put up a mill to crush and work it. Several tons were hauled to Locklin's mill a short time since and crushed as an experiment. It paid at the rate of \$1 per ton. Owing to the immense quantity of the cement at hand, the ease and cheapness with which it can be handled, and the large amount that can be run through a mill in a given time, it is claimed that it can be worked at a good profit. There are thousands of tons of this cemented material lying exposed in the old hydraulic diggings, near where the mill will be erected. The success of this venture will no doubt cause other mills to be put up in many of the old gravel mines where the cement abounds.

HEAVY SNOWFALL.—Ormonde Cor. Tidings: The snow in this region at the present time is nearly everywhere. It is over head, it is under foot, and is in and out every crack and cranny of our dwelling houses. The snowfall immediately on the south Yuba river, at this place, has been comparatively light, but only a few hundred feet higher up on the hillsides and mountains it is any depth that a tenderfoot would be pleased to see it. At the California mine, five miles north from this place, the

snow is 13 feet in depth. At the Gambrinus mine, only a mile or so farther north, it is 16 feet deep; at Enreka it is 12 feet; at Enreka and Beauman summit it is 20 feet; at Faucherie lake 17 feet, and at Grouse ridge, at the head of Fall creek, eight miles northeast of this place, is over 20 feet in depth; farther both north and east the snow is much deeper. At the Eagle Bird mine the company are now employing somewhere between 20 and 80 men in prospecting the mine. The main shaft is now down about 750 feet, and tunnels are being run in different parts of the mine; should a new pay shoot of ore at any time be discovered, more men will be put on and mill started up again as usual. The Yuba mine is now clear of water and sinking the shaft is now in progress; it is to be sunk 200 feet deeper and the work is to be done by Chinamen.

At the Blue Jay mine, owned by Bangh & Bonney, four men are steadily employed in breaking and hoisting rock by windlass from their mine. Their ledge is from a few inches up to eight feet in width and a good deal of the rock is quite rich in free gold and galena sulphurets. As far as developed this mine is the richest one yet discovered in the Washington mining district, which is saying considerable, but it is a fact nevertheless.

The German mine at this place still remains closed down, and is more than likely to remain in the same condition for some time to come, or at least until the snow disappears so that teams can get in to the mine.

A TWENTY-STAMP MILL.—Telegraph: The Osborne Hill Mining Company will build a 20-stamp mill, with all the modern appliances, and it will be built as soon as there is a possibility of getting machinery and lumber on the ground. Supt. Goldstone informed us to-day that a contract for the necessary lumber for the mill would be let in a very short time. The site for the mill is just about as good as it could be, and the mine is looking fine and is in good shape for working.

Placer.

AN OLD MINE REOPENED.—Sacramento Record-Union: A company formed here last fall purchased an old and abandoned quartz mine at Horseshoe Bar, Placer county, which was worked years ago by the then Golden Rule Mining Company, and formerly owned by the late Horace Adame, C. H. Krebs and others.

The new Golden Rule mining directors are all old and well known Sacramentoans—William Gutenberg, Nelson Wilcox, Lincoln White, J. B. Patterson, E. J. O. Rother and James I. Felter, the secretary. The latter has been advised that the main vein was struck this week, and Superintendent Rother, who is a man of large mining experience, pronounces it a finely developed mother lode, rich in free gold and sulphurets.

Thirty years ago there were thousands of miners on the American river at Horseshoe and Rattlesnake bars and in the immediate vicinity, and millions of dollars were taken out of the bed of the river and ravines by the crude methods of mining then in use.

The present company purchased this property from L. L. Crocker and J. W. Smyth. The latter has resided there continuously for forty years, as a miner, merchant, farmer and fruit-raiser, and claims to be the pioneer producer of citrus fruits in Placer county and central California.

DRAFT OF TWENTY MEN.—Colfax Sentinel: The Paragon mine at Bath made a draft of twenty men last Saturday. It is expected that the men will soon be put on again.

Work is steadily being pushed on the tunnel in the Alta mine.

The Gold King mine at Green Valley is working a force of thirty men. The mill works first rate and the cement looks promising.

The new company recently organized to work the Willis Gould mine at Iowa Hill are very much encouraged by the prospects they have already found and think the mine will soon be one of the best on the divide.

It is rumored that the Dardanelle mine at Forest Hill is soon to be sold to a large company.

The work in the tunnel at the Golden Eagle mine at Shady Run, after a short stop owing to lack of timbers, will soon begin again.

The Pioneer mine is looking better now than ever before in its history. The ledge is a solid one, being highly mineralized and yielding from \$10 to \$25 per ton. The pay-chute is extensive, and has the promise of yielding a vast amount of money to its already wealthy owners. This mine has been paying regular monthly dividends for the past three years, and each month finds the prospects growing brighter. Fifty men are employed and the 20-stamp mill is kept going night and day.

Plumas.

FROM RICH GULCH.—National-Bulletin, March 15: Chas. Schneider came up from Rich Gulch a few days ago, where he is doing some prospect work. He reports the Hallated Bros. crosscutting the vein in the lower or "Blacksmith" tunnel of their mine. The face of the drift is in 239 feet. The tunnel was cut beside the immense ledge, the crosscutting of which shows it to be 30 feet wide. This body of ore is reported to prospect well.

ELIZABETHTOWN CHANNEL.—National-Bulletin: Work at the shaft on the Kellogg ranch is now progressing favorably, although there has been considerable trouble with the pumps. The shaft is now about 45 feet. The large pump will soon be put in, when it is expected sinking will proceed with less interruption.

RESUMED WORK.—Granite Basin Cor. National-Bulletin: Weber & Chate have again resumed work in their mine, which promises to be one of the richest in Granite Basin. They have a tunnel in 250 feet, and 60 feet of perpendicular slope. They expect to reach the ledge in a few days, being already in the formation of the ledge. There is a 50-foot shaft sunk on

it, from which the boys have already realized considerable. The last quartz that was taken from the bottom of the shaft was very rich, far exceeding in richness and in width any that was ever taken out before. There is a ten-stamp mill and also an arrastra on the property.

Angust Banner and father have a quartz ledge they discovered while prospecting last spring, which, although very narrow, carries large quantities of the precious metal, simply repaying in quality what it lacks in width. It is situated a mile from any mill, and there is no road near it as yet, but the owners did not propose to let such little things as that dismay them; so they procured a pack mule and packed out five tons of quartz, which they had crushed for a sample test. The results far exceeded their utmost expectations. They have been working on the ledge all winter, and the rock continues as rich as ever.

Siskiyou.

READY TO HYDRAULIC.—Yreka Journal, March 7: Frank Hall, the well-known mining operator, having lately purchased the Finley Tribe mine at Salmon River, has just completed a new ditch to the same, with intention of starting the giants this week, so as to have a long season in pipping the rich ground. He has also 30 men at work building a five-mile ditch to the old Harris claim, so as to start giants at work on that claim in a very short time. He says Salmon river has a large number of people in search of mining property, all the hotels being crowded, the new wagon road having proven a great incentive in the way of development. Over \$20,000 of capital has been invested in mines since last spring in Liberty mining district, Mr. Hall having expended \$6500 for the company he represents.

The miners along Klamath river, in the Honoluh district, are making preparations to commence wing-damming and putting in water-wheels as soon as the winter storms cease and the river falls to its normal condition.

The Spengler Bros., at mouth of Humburg creek, near Klamath river, have a large force of men at work, getting down on bedrock, aided by a stout little steam engine for hoisting out boulders and pay gravel.

Dietrich, the Oak Bar expressman, intends working his cinnamon mine, at head of Smith river, in Oregon, near the Siskiyou and Del Norte dividing line, during the coming summer. Besides finding cinnamon in good paying quantity, he also found platinum, which is claimed to be more valuable than gold.

On the Salmon mountain, between Etna and Sawyer's Bar, the snow is very deep, about 12 feet on level at the summit, and in some of the canyons considerable more by drifting. The mail and express is taken over for eight miles of the distance on snowshoes, the men employed easily packing a mail sack and packages to the extent of 75 or 80 pounds each. With the aid of horses and cattle the wagon road might be broken to permit the navigation of wagons or sleighs, but as the Salmon river people are well supplied with staples, the trouble and cost will hardly justify, as the special needed can be packed over without much difficulty on snowshoes. In a short time, unless we have more heavy storms, not likely at this late period, horses and mules can make the trip, or else the people will then take steps to break the road. The new wagon road has been a great benefit to the Salmon river section, and has caused many mining speculators to visit that section and purchase mining property, with the result of making it one of the most prosperous mining districts on the coast. In a few years more the business will become so extensive that the wagon road will be kept open all winter, as a necessity for the accommodation of travel and transportation of freight, express and mail matter.

GOLD IN A POCKET.—Yreka Journal, March 21: A man and his wife, mining on Yreka Flats, found \$200 in gold under some bowlders last week, a rich spot not disturbed during the flush times of the '50 period, when the flats yielded rich returns without much labor or cost, as the diggings were shallow. An old man who worked on the flats in early days has also been doing very well in scratching over old-worked ground, having lately returned from Idaho dead broke to make a living at the old places where he took out great quantities of gold in early days.

A party of young men who have leased the Scheld & Pellet claim on Greenhorn gulch are taking out good pay, giving one-fourth to the claim-owners for privilege of working same and using apparatus connected therewith.

There is considerable mining in all the old diggings this winter and spring, with the benefit of plenty of water, the best season in this respect ever known in Siskiyou, by reason of the storms coming in such regular rotation at stated periods to be of good practical use.

The miners at Hawkinsville, about two miles north of Yreka, and in all the gulches leading down to that place, are doing exceedingly well this season, with plenty of free water to keep their sluices supplied in washing the rich auriferous gravel found along the hedrock in all sections of Hawkinsville mining district.

In most of the high mountain gulches and creeks, such as Greenhorn, Humburg, Deadwood and Cherry creeks, in this vicinity, the snow is from two to three feet deep, but the warm rains of the past few days have been dissolving it rapidly, so that miners will soon be able to commence operations with good success until later in the season than usual. Along the foothills, where there is no snow, the miners are busily at work, as the melting snow higher up affords plenty of water for washing. At Indian, McAdams, Shackelford, Kidder, and several other creeks along west side of Scott valley, there is also an abundance of water, with a great amount of snow on the mountains above to keep up the water supply in benefiting the miners for placer, hydraulic and quartz mining.

The same may be said of the Salmon River, Cottonwood, Scott River, South Fork and other mining districts, to make the output of gold from Siskiyou for 1894 the greatest ever known in the history of the county.

Trinity.

TELEPHONE LINE.—Weaverville Journal: The La Grange Hydraulic Gold Mining Company has contracted with S. L. Blake and E. P. King for a telephone line to run from the end of its ditch near Rush creek to the boarding-house at the mine and thence into town. Work has already been begun on the contract; the material has been ordered, and the line will be pushed to completion as rapidly as the weather will permit. This line will be a great convenience to the company.

Tuolumne.

NEW MILL STARTS.—Independent: The Bnzard Roost is situated on the Stanislaus river near Parrott's Ferry, about 200 feet above the level of the river. The new five-stamp mill has been completed and the work of crushing has commenced. The owners do not know as yet the value of the ore, but say that it will reach a fair average. The shaft is now 100 feet in depth, with a crosscut of 85 feet to the vein and has run 57 feet on the course of the vein. This company has a free water power, taking the waste water from Vine springs.

The Seminole, near Summerville, is getting under headway as rapidly as the weather will permit. A new road is in course of construction to the property, and a foundation for their mill is nearly finished. Development work is constantly in progress, while some very rich rock is being taken out. This mine, it is said by competent judges, will be one of the best paying properties in the county in a short time.

Col. Coles, who has charge of a group of mines near Summerville, reports his properties looking well and that active operations will commence shortly.

Good prospects continue in the Cardinelle mine. Quartz shown in Sonora this week was thoroughly impregnated with gold.

The property of the Saratoga Development and Improvement Company, near Springfield, has been sold to Oakland parties.

It is reported that the Badger mine will start operations within a few weeks, by a San Jose company.

J. T. Bluet has leased the Sweeney mine, on the mother lode, in the interest of Wm. Johns.

NEVADA.

Washoe District.

SUMMARY OF COMSTOCK OPERATIONS.—Following is a summary of the official news in letters from Comstock mines:

In the Consolidated California & Virginia mine on the 1650 level the drift running north from the east crosscut No. 1 from the north drift from the winze—down 52 feet—has been extended during the week 25 feet; total length 37 feet; continuing in porphyry, clay and quartz of low assay value. Have extracted from the workings in the vicinity of the winze—down 20 feet—25 tons of ore assaying \$35.85 per ton. The average assay value, per battery samples, of all ore worked at the Morgan mill during the week (43 tons and 1390 pounds) was \$34.33 per ton. Have shipped to the company's office in San Francisco four bars of bullion, assay value \$17,250, yield of 683 tons and 1390 pounds of ore worked at the Morgan mill. 1000 level—the Rule drift—the upraise from this drift started at a point 253 feet south of the shaft station has been carried up during the week 40 feet, continuing in porphyry, clay and quartz of low assay value. The east crosscut, No. 2, started from the drift at a point 527 feet from the shaft station, has been extended 20 feet; total length 69 feet; face in porphyry with clay and lines of quartz. The progress in these localities has been retarded during the week on account of repairs being made to the shaft between the 1000 and 1100 level stations by the West Consolidated Virginia & California Company, which required for that purpose the use of the shaft for a large portion of the time.

In the Ophir mine the recently started west crosscut on the 1465 level is up 33 feet. The face continues in porphyry, clay and quartz. An advance of 52 feet was made during the week in reopening and repairing the Central tunnel, making the total length of the drift reopened from its mouth 936 feet. The progress made during the week was somewhat slower than heretofore, and was owing to the more compact condition of the ground passed through. Have continued (jointly with the Mexican Company) the work of making repairs to the main shaft. In the Mexican mine, on the 1465 level, the new upraise is up 30 feet. The top is in a porphyry formation. At the Union shaft on the 900 level the Union Con. and Sierra Nevada joint east crosscut near the north line of the Union mine started from joint north drift, which was run from the joint west drift at a point 1520 feet west of the shaft, has been extended during the week 22 feet; total length 156 feet; face in clay and porphyry, from which there is a small flow of water. In the Andes mine, on the 420 level, west crosscut No. 3 was extended 18 feet; total length 88 feet; formation clay, porphyry and seams of quartz.

In the Best & Belcher mine, on the 900 level, the east crosscut which is being run on the north boundary has been advanced 21 feet, passing through porphyry; total length 413 feet. In the Hale & Norcross mine, on the 1300 level, they have stopped work from the winze, the ore at this point being too narrow and too low in value to warrant extraction. The station on the 1100 level has been repaired, and are now cleaning out and repairing the main south drift, which will be completed to-morrow, and then will resume work in the face of the south drift. In the Kentucky Con. mine, on the 1100 level, the incline raise from the south for an air connection is up 33 feet in quartz with apots

of ore. On the 1200 level the joint lateral drift with the Yellow Jacket running south in the west ledge is on 15 feet; face in gold of milling grade. From the Occidental Con. mine they extracted during the week about 8 tons of ore from the 400 level, of the average assay value of \$40 per ton. The west cresscent on the 400 level has been extended 9 feet; total length 16 feet; face in porphyry.

Potosi.—The south drift on the 450 level has been advanced 28 feet; total length 228 feet; face in porphyry, clay and hnnches of quartz which yield fair assays. The north west drift from the south drift, on the 450 level, has been advanced 30 feet; total length 59 feet; face in porphyry, clay and low-grade quartz. Hays started an npraise from the last named drift, which is up 4 feet; top shows porphyry and quartz which gives fair assays.

Chollar.—Have started a drift north from the stope on the 100 level which is on 24 feet; the face is in porphyry and low-grade quartz. Are running a drift west, 28 feet below the 100 level, which is on 36 feet; face in porphyry. No ore was extracted during the past week. Milled during the week 91 tons and 1600 pounds. On hand at mill none. Shipped to U. S. Mint at Carson 314 pounds of crude bullion.

Bullion.—The west drift from the station, 820 level, Ward shaft, is on 627 feet from the shaft; face in porphyry.

Alpha.—Are yet engaged in retimbering the old Alpha shaft below the 122 level.

Sierra Nevada.—The south lateral drift from the intermediate tunnel has been advanced 7 feet; total length 491 feet; face in hard porphyry. Wa have completed putting in a compressed-air pipe and are now running machine drills. The joint Union Con. east cresscent near north line, from the north drift 1520 feet west of the shaft, 900 level, has been advanced 22 feet; total length 156 feet; face in clay and soft porphyry, from which there is a small flow of water.

Scorpion.—The east cresscent started in the joint north drift on the 900 level from the Union shaft was advanced 13 feet; face is in a favorable looking formation of porphyry, clay and quartz giving low assays; from the present explorations the stratification appears to be running southeast and northwest, with a dip to the southwest.

Devil's Gate District.

A PATINO PROPERTY.—Enterprise, March 18: Harry Brown made a recent run of 21 tons of ore from the Sonthend mine in Devil's Gate district. The gross bullion proceeds of the run were \$1162.49, or an average of a little more than \$55 a ton. Of this yield \$643.33 was gold and \$514.16 was silver. The net proceeds of the run were \$371.82. The amount of silver in the ore from the Sonthend is something unusual in that district, where, with the exception of the Haywood, the ore is almost exclusively gold-bearing. The Sonthend location is controlled by F. A. Bierke, who leases it on a royalty. The vein from which this ore was extracted is over five feet in width, of which 18 inches is pay. The property is worked through a tunnel 1000 feet in length, which cut the vein at a depth of 200 feet below the surface. There is a large amount of ore uncovered in the tunnel, and the fact that the vein carries such a large percentage of silver is considered an indication of its extending downward to a much greater depth than the tunnel level.

Taylor's mill is about to begin dropping its stamps on another batch of ore from the Oest mine, and the cleanup for the current month, it is intimated by outside parties, will exceed \$20,000. The ore from the Oest is almost exclusively gold-bearing.

The Haywood continues to be a steady ore-producer. The ore, as stated above, contains a percentage of silver; and, although not as high in grade as that from the Oest, it is still paying a good margin above the cost of extraction.

Ferguson District.

A MILL CONTRACT.—Pioche Record: The Magnolia management has contracted with Johnny Ferguson of the Hiko mill for 800 tons of ore, and teams for hauling are in demand. This means that the treatment at the mill is satisfactory, despite the rumors to the contrary which of late have been circulated.

Having ceased ore shipments from the Monitor, Messrs. Reeves, Ellis and Wilson will complete their 500-ton contract with the Bullionville Company with ore from the April Fool and Junho mines. There is a good lot out at the April Fool claim already, but a few men may be put to work on each property.

Silver Star District.

THE NEW GOLD MINES.—Walker Lake Bulletin, March 14: The mines are about 33 miles southeast of Hawthorne and are easily accessible, either from here or any railroad station between this place and Belleville. The main camp is eight miles from Soda Springs and four miles from the Garfield mill, and east of the old Excelsior mine about five miles.

Thirty years ago the Excelsior mine was worked for silver by residents of Anrora. But in those days prospectors were in search of silver only, and quartz that did not show the white metal was passed by unnoticed.

It is doubtful if a miner's pick was ever stuck in the ground now being prospected prior to last September, when a company consisting of W. J. Douglass, Dan Robb, George Fottler, Dan Bowen, Thos. Pepper and E. Grassie, was organized in Sodaville to prospect the surrounding country.

In September last, gold quartz was found on the claim now known as the Dnke. Surface indications were followed east and west, the ledge being plainly visible for a distance of two miles. Subsequent exploration shows that the ledge runs for a distance of four miles and locations have been made for that distance, and yet the end has not been found. From the location of Charles Ganong on the east to that of Fleming & Grassie on the west is over four

miles, and there is an unbroken line of locations connecting them.

The first mine visited was the Orphan Boy of Douglass & Co. There is a tunnel in 64 feet and an incline down about 20 feet. The ledge is a strong and a well-defined one, two feet wide, and the ore assays from \$25 to \$35. There are about 15 tons of ore on the dump. The hanging and foot walls are porphyry.

Hard Scabbie.—This mine is parallel to the Orphan Boy, and is the property of Ed. Brown. There is an excavation on this ground about 20 feet deep, 8 feet wide and 6 feet high, and everything carries gold. Out of the hole described about 40 tons of ore were taken. Mr. Douglass, who is a practical assayer, has made assays of this ore, and he places the average value of it at \$50 per ton. There are no walls here—ore over head, ore under foot and ore on both sides of the miner.

New Party.—This mine is an extension of the Hard Scabbie. An incline 20 feet deep shows a big ledge of \$5 to \$20 ore. Union canyon runs through this location, and where the ledge crosses the ravine a mass of quartz croppings 12 to 15 feet high stares the visitor in the face.

Excitement.—This mine is a westerly extension of the New Party. The same ledge of fine quartz is plainly seen clear through the claim. There are several other ledges exposed on this ground. No development work has been done here as yet, although the float pans well.

Dnke.—This mine is where gold was first found. An incline 20 feet deep exposes a strong ledge, which pans \$5 to \$10.

Fottler.—This mine is across Robb's ridge on the east side, facing Garfield. Here is a ledge the exact width of which is not yet known. Five feet of ore exposed pans about \$15.

Deluvia.—This mine is the property of Grassie & Pedrazzi. A tunnel in 45 feet shows a strong ledge which is placed at \$15, although samples tested at Hawthorne were of much lower grade. There are 15 tons on the dump.

Julia.—Fleming & Grassie have a good, well-defined ledge two feet wide exposed here. A tunnel of 15 feet and an incline of 10 feet is the extent of the work done. About 12 tons of good grade ore are on the dump.

Dolly.—A strong ledge of \$10 to \$15 ore is exposed in three different cuts, none of which is out of daylight.

Donlop and Truman have a tunnel in 50 feet. For a while the ledge was running flat and was of poor grade, but in the face last Thursday it took a sharp downward pitch and the grade of ore was much improved.

Hard Luck.—Douglass & Co. have a tunnel in 60 feet and a drift 35 feet on the ledge. A big pile of ore is on the dump which Mr. Douglass estimates to be worth \$13 per ton.

Gem.—This mine is the property of Robert Stewart and J. P. Harrington. An incline eight feet deep shows a vein of lively quartz. The gold on this claim is much coarser than that on those above described. A second cut exposes a foot of quartz which prospects well in free gold, and the sulphurets of the same are rich.

The mines mentioned are all upon which any work has been done, although each claim-owner has dug sufficiently to show that he is on the ledge.

Robert Webster, A. W. Curtis, James Lothrop, Charles Ganong, John Obendorf, Hank Hof, C. A. Howard, Col. Cutting, Hill Bros., John Berger, John Maney and Frank Robbins have locations.

All the indications point to this being a busy camp ere long. If the ledges now being worked "go down" and hold as good grade as now, it will be as big a camp as the State ever produced. This will be considered a bold assertion, but all the appearances warrant it. The ledges are large. The grade of ore is good; it is gold ore. There is water and wood on the ground. The camp is within a few miles of the railroad and, in fact, it has every conceivable advantage.

ARIZONA.

CYANIDE AT TOMBSTONE.—Prospector, March 14: At the West Side mine Mr. Eltonhead is at work with his electro-cyanide experiments.

He is running through a batch of screenings from a manganese dump that assayed 13 ounces silver per ton, from which he is extracting and precipitating 90 per cent at a cost of less than \$2 per ton. To obliterate the technical language from the description of the process, it is about this way: A box ten by five feet is divided into four equal parts by three planes running lengthwise, making what might be termed four troughs. Quicksilver covers the bottom of these troughs to the depth of a quarter of an inch. The solution, after passing through the screenings in a tank adjacent to the troughs, is conveyed through a pipe to one end of one of the troughs where it passes down over the quicksilver, around through an aperture into the next trough, then to the next and then the next until it has passed through each trough and through an outlet into a barrel. The solution is about a half inch deep over the quicksilver at all times. The quicksilver is charged with electricity by a dynamo, and, when thus charged, precipitates the gold and silver, which form an amalgam the same as by the ordinary process of milling. About eight volts are all that is required to produce the necessary electric current. The present work is only experimental. Application for patents has been made. Mr. Eltonhead will test a shipment of ore from Cripple Creek, which is on the way at the present time. With the small concern at his command, he can treat 25 tons of solution in 12 hours. From 100 to 200 tons of ore can be treated before it is necessary to make a clean-up. This depends of course on the richness of the ore. Mr. Taylor, of the Grand Central Co., who will be with the new owners of the Congress mine, was present this morning and was much enthused over the

working of the process. It is probable that experiments will be made with the tailings and also with some of the ore of the Congress by this process at an early day. With gold ores, Mr. Eltonhead has saved 100 per cent.

GALENA VEIN OPENED.—Kingman Miner, March 17: In the lower workings of the Schnylkill mine at Chloride an 18-inch vein of solid galena ore has been opened up by the Southwestern Mining and Smelting Company. The ore runs better in gold than does that from the surface workings.

There are said to be some splendid gold properties in the country embraced in the big bend of the Colorado river. Prospectors who went there from White Hills last summer made many locations, and there is a fair prospect of inducing capital to invest in them.

J. C. McKenzie has bonded from W. F. Grounds a number of valuable gold properties in Mnsic mountain. It is understood that he will try to induce Colorado capital to invest in these mines and erect mills. Water will be taken to the mines from springs in the adjacent mountains.

W. A. Neal has located a ledge on Burro creek that surpasses anything heretofore discovered in that country. The vein is two feet in width and is all ore. It is located on the side of a mountain and pitches or dips with the hill. A tunnel started in 60 feet below the outcrop cut the vein before it was fully under cover. The ledge wherever opened shows the same rich quality of ore, and the lucky owner is hard at work taking it out to send to market. Mr. Neal will make his first shipment to the sampler next week.

IDAHO.

MONTHLY STATEMENT.—Following is a synopsis of the manager's report of the DeLamar Company for the month of February, 1894:

Tons crushed.....	3,091
Value bullion realized.....	\$70,041 00
Value ore shipped.....	12,090 00
Miscellaneous receipts.....	256 00
Total.....	\$82,387 00
Expenses.....	36,197 00
Estimated profit.....	\$46,190 00

OREGON.

GOOD NUGGET.—Rogue River Courier: Holcombe & Robinson are running a paying placer on upper Jump-off-Joe. Last week a nugget was picked up which weighed \$62. The week previous one was uncovered valued at \$74.

Lister, Calvert & Holyoke are developing a promising claim near by. They are preparing to ditch and pipe in time for next season's water.

Bailey & Fargnhar have their new mill almost ready for crushing at the Mountain Lion on Mission Flat. The roads between the Rogue River bridge at the foot of Sixth street have been badly cut up by hauling the heavy plant over them. The teamsters had a tough time miring down and digging out, the sand which was peppered over the highway last fall having done nothing further than to make freighters swear.

Hall & Beck are working seven men on their placer and quartz mines on Louse creek, eight miles from this city. M. F. Hall was in town Tuesday and exhibited a \$54 nugget, which was washed in sight by one of his two giants. Several smaller nuggets were uncovered previously, but no note is taken of small things at the Hall & Beck mine. They are also driving a tunnel on their quartz ledge which proves to be the source of big nuggets for the placer below.

Messrs. Smith & Pierce have a bonanza within two miles of Gold Hill. They are going down on a ten-foot ledge of rich rock and have a splendid stamp-mill proposition.

Clark & Son of Leland are cleaning \$1 an hour off their two-stamp Tremaine mill within four miles of Gold Hill. This is pretty good wages for three men.

The Hammersmith suit has been settled, and the original locator will take possession of the valuable property on the 22d inst. Digging and crushing will proceed without stoppage.

BRITISH COLUMBIA.

ON THE QUESNELLE RIVER.—John B. Hobson, formerly well known in California as a hydraulic miner in Placer county, is manager of gold mines in British Columbia that are owned by the Canadian Pacific railroad men.

The mines are some sixty miles east of Fraser river, the northerly one being located near Quesnelle Forks, on the Quesnelle river, and the other on Horse Fly creek.

A number of Chinese have been working the gravel for several years past in the primitive fashion of the forty-miners, and have taken out large quantities of gold. It remained for the present owners of the mines to discover their great value. Mr. Hobson says that from the drifting done by some ten or twelve men under his direction last summer he is prepared to believe that the mines will exceed anything of the kind California ever saw. A large and costly hydraulic plant is being established.

Complimentary Samples.

Persons receiving this paper marked, are requested to examine its contents, terms of subscription, and give it their own patronage, and, as far as practicable, aid in circulating the journal and making its value more widely known to others, and extending its influence in the cause it faithfully serves. Subscription rate, \$3 a year. Extra copies mailed for 10 cents, if ordered soon enough. If already a subscriber please show the paper to others.

Double Acting Plunger.

Wm. Nance of Grass Valley, Cal., directs attention in another column to the reduction in the weight of pumping machinery, a matter of importance to mine-owners generally, and especially to those working mines far away from a railway.

Notices of Recent Patents.

Among the patents recently obtained through Dewey & Co.'s Scientific Press U. S. and Foreign Patent Agency, the following are worthy of special mention:

WASHING MACHINE.—Joel S. Blood, Houghton, Washington. No. 516,428. Dated March 13, 1894. This machine is an improved form of that type in which a connected plunger and presser are caused to reciprocate within a casing which is provided with a bottom passage through which the water circulates by the action of the plunger. The ends of the casing slope inwardly, to provide for a better circulation of the water. A space or compartment for soaking the clothes is provided in one end of the casing. The plunger has a valve which avoids back pressure. A sliding cover is adapted to inclose the casing while in operation. These several improvements, together with some minor ones, serve to make the whole machine complete and effective.

CAR COUPLING.—David J. Stevenson, Bakersfield, Cal., assignor, by direct and mesne assignments, to John M. Keith of same place. No. 516,457. Dated March 13, 1894. This device belongs to that class in which the link and pin are automatically coupled through the agency of spring-controlled slides within the drawhead, which are actuated by the entering link to lift a spring-controlled lever arm which carries the pin. The present invention is an improvement on a prior patent to the same inventor, and consists generally in the changing and modifying of the several parts which, as a whole, result in general simplicity and effectiveness, and provide a perfect automatically coupling device of the ordinary link-and-pin kind.

GRAVEL OR DIRT WAGON.—Arthur W. Coats and James Bartlett, Ukiah, Cal. No. 516,564. Dated March 13, 1894. This wagon consists essentially of a bed having its bottom composed of a hinged, swinging, horizontal section; one or more hinged, swinging, normally inclined sections; means for locking and relieving the horizontal section and connections from the horizontal section, whereby its dropping movement serves to swing the inclined section to a greater inclination. The object is to provide a simple and effective self-dumping wagon which can, when necessary, be converted into an ordinary wagon with a common bed.

JAIL CONSTRUCTION.—David Salfeld and Hermann Kohlberg, San Francisco. No. 516,450. Dated March 13, 1894. The object of this invention is to construct a building which will be specially applicable for jails, prisons and buildings where it is desirable to incarcerate persons to retain them safely under constant surveillance and at the same time keep them separate from and invisible to each other. It is of great importance in the construction of jails to so situate the inmates as to be subject to the vigilance of the keepers at all times, and also to separate them from each other so that they can have little or no communication, as well as to prevent the inmates already in the cells from having a knowledge of others that may be brought in from time to time. In this invention a circular construction is adopted, having a central guard-room, an intermediate open space exterior to it, and a cell space forming any desirable portion of a circle exterior to the intermediate space. The cells and the intermediate passages formed in this portion have their walls in radial lines from the center, so that each passage is visible, and the doors opening into the cells are at opposite ends of the passages and so constructed that no sight or communication between the inmates can take place. The interior ends of the passages between the cells may, if desired, all be closed whenever new prisoners are to be brought in, so that no sight or knowledge of them can be obtained from inmates already there.

CAN-SOLDERING MACHINE.—Mathias Jensen, Astoria, Oregon; assignor of one-half to the Jensen Can-Filling Machine Company. No. 516,308. Dated March 13, 1894. This invention relates to a novel means for applying solder to the longitudinal side seams of cans. It consists of a roller, journaled to rotate longitudinally within the solder bath and beneath the cans, which are moved along above and parallel with this roller with the longitudinal seams at the lowest point, so that the rotation of the roller continually carries up a body of molten solder and applies it to the seams while the cans are passing above the roller.

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR THE WEEK ENDING MARCH 13, 1893.

- 516,292.—VOTING BOOTH.—E. F. Barry, Elk Grove, Cal.
- 516,425.—EASEL.—Hattie F. Beecher, Port Townsend, Wash.
- 516,423.—FEED WATER HEATER.—J. B. Bell, Troutdale, Or.
- 516,428.—WASHING MACHINE.—J. S. Blood, Houghton, Wash.
- 516,261.—PROPAGATOR.—A. H. Carpenter, Stockton, Cal.
- 516,564.—DIRT WAGON.—Coats & Bartlett, Ukiah, Cal.
- 516,298.—DYNAMO.—F. J. Cronch, Junction City, Or.
- 516,592.—DOOR LOCK.—W. T. W. Curi, Los Angeles, Cal.
- 516,501.—PROGRAMME HOLDER.—E. Douglas, Hanford, Cal.
- 518,303.—TOBACCO JAR.—M. Goldwater, Prescott, A. T.
- 516,437.—FRUIT CARRIER.—W. E. Howell, Los Angeles, Cal.
- 518,308.—CAN SOLDERING MACHINE.—M. Jensen, Astoria, Or.
- 516,440.—SEPARATOR.—R. W. Jessup, Los Angeles, Cal.
- 516,442.—BLOWING ENGINE.—C. A. Klotz, Vallejo, Cal.
- 516,450.—JAILS.—Salfeld & Kohlberg, S. F.
- 516,457.—CAR COUPLING.—D. J. Stevenson, Bakersfield, Cal.
- 516,557.—DIRT WAGON.—M. Stone, San Diego, Cal.
- 516,239.—SAFETY PROTECTOR.—C. F. A. Sturte, S. F.
- 518,240.—WINDOW PROTECTOR.—C. F. A. Sturte, S. F.
- 516,320.—KEY HOLDER.—J. F. Walsch, Los Angeles, Cal.
- 516,384.—TYPE WRITER.—Leonie Welsplel, S. F.

NOTE.—Copies of U. S. and Foreign patents furnished by Dewey & Co. in the shortest time possible (by mail for telegraphic order). American and Foreign patents obtained, and general patent business for Pacific Coast inventors transacted with perfect security, at reasonable rates, and in the shortest possible time.

MINING SHAREHOLDERS' DIRECTORY.

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ASSESSMENTS.

COMPANY AND LOCATION.	No.	AMT.	LEVIED, DELINQUENT AND SALE.	SECRETARY.
Andes S M Co, Nevada.....	49.....	250.....	Mar 6, April 10, April 23.....	Joho W Telaga, Nevada Block
Belcher S M Co, Nevada.....	18.....	150.....	Mar 15, April 17, May 8.....	F L Perkins, Mills Bldg
Bodie Cons M Co, California.....	17.....	150.....	Mar 10, April 16, May 14.....	M E Willis, 414 California
Caladenia O M Co, South Dakota.....	18.....	500.....	Mar 5, April 10, May 10.....	F G Drum, Mills Bldg
East Oal & Va M Co, Nevada.....	4.....	500.....	Mar 6, April 10, April 28.....	A W Havens, Nevada Block
East Sierra Nevada M Co, Nevada.....	5.....	500.....	Jan 10, April 20, May 11.....	Oeo R Spinyer, 310 Pine
Edwards M Co, California.....	7.....	250.....	Feb 6, Mar 12, Apr 3.....	Otto von Suden, 310 Bush
Gould & Curry S M Co, Nev.....	73.....	150.....	Jan 31, Mar 8, Mar 29.....	A K Durbin, New Block
Justice M Co, Nevada.....	16.....	100.....	Feb 6, Mar 12, April 2.....	R E Kelly, Nevada Block
Martin White M Co, Nev.....	29.....	250.....	Jan 15, Feb 24, Mar 31.....	K L Ross, Sup Court Bldg
Overman S M Co, Nevada.....	10.....	100.....	Mar 5, April 10, April 30.....	Geo D Edwards, 414 California
Peer M Co, Ariz.....	16.....	50.....	Jan 24, Mar 5, Mar 26.....	Aug Waterman, New Block
Peterson M Co, Ariz.....	21.....	50.....	Jan 26, Mar 5, Mar 26.....	Aug Waterman, New Block
Potosi M Co, Nevada.....	41.....	250.....	Mar 6, April 16, May 2.....	Chas E Elliot, Nevada Block
Savage M Co, Nevada.....	53.....	250.....	Mar 5, April 9, April 30.....	E B Holmes, Nevada Block
Seaton M Co, N Va.....	5.....	100.....	Jan 14, April 13, May 7.....	Geo R Spinyer, 310 Pine
Stratton M Co, Cal.....	6.....	250.....	Jan 26, Mar 7, Mar 27.....	Okas T Bridge, 224 California
Seg Belcher & Mides Cons M Co, Nevada.....	13.....	100.....	Feb 5, March 9, March 23.....	E B Holmes, Nevada Block
Sis Iyona Quicksilver Co, California.....	8.....	700.....	Mar 2, April 6, April 27.....	Edw F Stone, 306 Pine
Torres Mining Co, Mexico.....	15.....	500.....	Feb 16, Mar 23, Apr 10.....	K J Willata, Flood Bldg

MEETINGS.

COMPANY AND LOCATION.	MEETING. SECRETARY AND OFFICE IN S. F.	DATE.
Con. Wyoming O. M. Co.....	Annual.....W. J. Gunnert, 38 Pine.	April 4

Market Reports.

The Markets.

SAN FRANCISCO, March 22, 1894.

The silver market has shown but little change during the week. It might have been expected that the passage of the seigniorage bill would have had some effect, but the absolute lack of information as to whether the President will or will not sign, have made it questionable if it will become a law, and there has been neither an upward nor downward tendency. The market is simply waiting. It is not known at this writing what the President intends to do. Opinion is about equally divided. To-day's New York quotation is 59 3/4c.

American Copper Product.

The New York Engineering and Mining Journal reports the copper product of the United States for 1893 as follows:

Montana product, the.....	160,092,711
Michigan.....	113,742,140
Arizona.....	43,717,423
Other Domestic Sources.....	15,813,235

Total domestic.....	332,585,500
From Imported ores.....	7,233,387

Total.....	339,808,887
Stock January 1, 1893.....	56,000,000

Total.....	386,308,887
Exports.....	130,066,880

Total.....	256,242,007
Imports.....	5,538,690

Available supply.....	211,778,697
-----------------------	-------------

The quantity allowed for consumption in 1892 was 265,380,000 pounds. It ought to have been larger in 1893, but it could not have been much over 200,000,000 pounds, if the supply be correctly reported as above. The domestic product for 1892, as given by the same authority, was 325,180,000 pounds, while the quantity extracted from foreign ores was 10,200,000 pounds, but the exports for that year were only 90,000,000 pounds. The product for 1891 was 286,100,000 pounds, and 11,500,000 pounds were taken from foreign ores. For the past two years Montana has led all other sources in the quantity produced, though the total from that State last year was 14,000,000 pounds less than in 1892.

Lead.

Lead shows more firmness, being possibly influenced by the report of the Senate Committee fixing an absolute tariff charge of 3/4c per pound on lead and lead ores.

New York Prices.

NEW YORK, March 22.—Following are the closing prices for the week:

	Silver in	Copper.	Lead.	Tin.
Thursday.....	27 1/2	59 1/2	3 15	19 10
Friday.....	27 1/2	59 1/2	3 20	19 10
Saturday.....	27 1/2	59 1/2	3 20	19 10
Monday.....	27 1/2	59 1/2	3 20	19 05
Tuesday.....	27 1/2	59 1/2	3 20	18 80
Wednesday.....	27 1/2	59 1/2	3 20	19 00

San Francisco Metal and Coat Market.

ANTIMONY.		QUICKSILVER.	
Per lb.....	@ 13	Home trade, pr.	flask.....30 00 @—
BORAX.			
Refined, in car lots.....	@ 71	STEEL.	
Powders, do.....	@ 71	English, B.....	@ 20
Concentrated, do.....	@ 71	Oanton tool.....	@ 64
All grades jobbing at advance.		Blk Diam'd tool.....	@ 15
COFFER.			
Bolt.....	23 @—	Pick & Hammer.....	@ 10
Sheeting.....	23 @—	Machinery.....	@ 4
Ingots, jobbing.....	@ 20	Pig TIN.	
Do, wholesale.....	15 @—	Spot @ B.....	21 @ 22
COAL.			
Bar, base.....	@ 21	Spot FROM YARD—PER TON.	
Norway, base.....	@ 41	Wellington.....	88 00
PIO IRON.			
Eglinton @ ton.....	50 @—	Ore.....	7 50
Glenbrook.....	22 50 @—	Glenn.....	6 50
Am. Bots, No. 1.....	@—	Seattle.....	6 50
Shute No. 1.....	22 50 @—	Ocos Bay.....	6 50
Puget Sound.....	@—	Cannel.....	9 00
Olay Lane White.....	22 50 @—	Egg, hard.....	12 00
Langdon.....	22 50 @—	Wallend.....	7 25
Carlsberg.....	22 50 @—	Scotch Splint.....	6 00
Barrow.....	22 50 @—	Brymbo.....	7 50
Oargo Reef.....	@—	West Hartley.....	7 50
LEAD.			
Pipe.....	@ 61	To LOAD—PER TON.	
Drop, sizes smaller than		Australian.....	6 50 @—
B, @ bag of 25 lbs.....	\$1 75	Liverpool Steam.....	6 50 @—
Do, B and larger sizes		Booth Splint.....	6 00 @—
@ bag of 25 lbs.....	2 00	Oversize.....	6 50 @—
Black, Balla and Chilled		Do, spot, in bulk.....	@ 12 00
do, @ bag of 25 lbs.....	2 00	Do, in sacks.....	@ 12 00
		Omnibland.....	9 50 @—

J. F. CROSETT, Commission Mining Agency,
628 Sacramento St., San Francisco, Cal.
Buy and Sell Meritorious Mining Properties. I have orders for Income-Paying Mines at the present time. Have also some good properties for sale. I want more mines to offer to purchasers and also desire more purchasers to examine properties I have to offer. Correspondence solicited.

Mining Share Market.

SAN FRANCISCO, March 22, 1894.

The San Francisco Stock and Exchange Board yesterday endorsed an amendment to the Constitution permitting fluctuations of one cent per share in all mining stocks upon the list which sell below \$1 per share. Heretofore no change of less than five cents was allowed. The new rule went into effect immediately after the executive session was over, which was at 10:15 A. M. At the start it looks to many dealers as if this new departure at the San Francisco Stock and Exchange Board is designed to take away much of the business of the Pacific Board brokers. At the Pacific Board fluctuations of one cent per share in stocks selling below \$1 have always been permitted.

The Comstock market showed gains during last week, but this week a much weaker tone and lower prices have prevailed. During the week Consolidated California and Virginia advanced from \$2.80 to \$3.45; Ophir from \$2.35 to \$2.75; Mexican from \$1.35 to \$1.65; Best & Belcher from \$1.55 to \$1.80; Potosi from 70 cents to \$1; Yellow Jacket from 60 to 80 cents; Belcher from 60 to 90 cents; and Crown Point from 40 to 65 cents. Our quotations to-day show to what figures the various stocks have receded.

Board Sales of Mining Stocks.

S. F. Stock Board.

THURSDAY, March 22, 1894.

9:30 A. M. SESSION.

100 Alta.....	120	200 Crown Point.....	52c
300 Andes.....	25c	400 G & C.....	70c
200.....	25c	250 H & N.....	70c
350 B & B.....	1.50	100 Ophir.....	5.00
100 Chollar.....	.40c	400 Potosi.....	.93c
750 O. O. & Va.....	2.50	50 Savage.....	.42c

2:30 P. M. SESSION.

100 Alpha.....	10c	200 H & N.....	50c
200 Alta.....	10c	300 Iowa.....	8c
1000 Andes.....	25c	300 Justice.....	13c
200 Belcher.....	.67c	480 Mexican.....	1.40
430 Best & Belcher.....	1.40	250 Ophir.....	2.40
470.....	1.40	100 Overman.....	1.1c
300 Bullion.....	.38c	300 Potosi.....	1.1c
300 Crown Point.....	.60c	50.....	.97c
400.....	.47c	600 Savage.....	.40c
650 Oal. & Va.....	2.76	100 Sierra Nevada.....	1.05
100 G & O.....	.85c	100.....	1.10
300 Grand Prize.....	.32c	300 Yellow Jacket.....	.61c
850.....	.4c		

Coast Industrial Notes.

—The total value of breadstuffs exported from Pacific Coast points during February, 1894, was \$1,606,882 against \$2,945,327 for the same month last year. The total for cattle and hogs and their products, together with oleomargarine and dairy products, was \$45,140, as against \$59,531 for the same month last year.

—The steamer City of Puebla, which broke down off Cape Flattery and was towed back to Port Townsend by the tug Wanderer, was libeled by the Puget Sound Tugboat Company for \$100,000. The owners of the Puebla offered the tug company \$1600, which was refused, the amount demanded being \$30,000. The Puebla will furnish bonds.

—A contract has just been entered into between the Pacific Improvement Company and Thomas Day & Sons. For the sum of \$46,000 the latter agree to build the car-house for the new electric line on the east line of Mission street, opposite Twenty-ninth, within 100 working days. The contract for building the power house for the electric systems of the Market-street Railway Company at the junction of Eleventh, Bryant and Channel streets was also agreed to. The poles have been erected nearly to the Five Mile House and a portion of the wires also stretched.

—A dispatch from San Diego says that Herbert L. Emery has sold his ranch in Pine Valley to the Pine Valley Consolidated Water and Land Company, together with the well-known Pine Valley reservoir site and water rights, where surveyors have reported that a perfect title exists for a dam that is capable of impounding eight billion gallons of water, two billions more than the Sweetwater reservoir. The Pine Valley Company, which is composed of Emery, his brother, General Eli H. Murray and others, is about to make arrangements to develop water rights on the land and to take advan-

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Weight of Machinery Reduced One-Half, besides doing away with the shaft. SPECIAL CONSTRUCTION OF STEEL only one-eighth part the weight of the old pump. Works with 10 per cent less power. First outlay one-third the cost of the old pump. Has been tested a year and proved to work satisfactorily in every respect. GLAND OF STUFFING-BOX TIGHTENED AND ROD LUBRICATED AUTOMATICALLY WHEN WORKING UNDER WATER. Works very much longer than any other pump under water.

IMPROVED SINKING OR BUCKET PUMP.

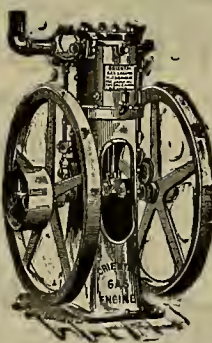
Bucket, clack and clack-acting changed under water. Bucket lasts six times as long as the old bucket, often saving expense of putting down another pump, especially in jack-hack pumps, where bucket and clack cannot be changed under water. Special attention is called to the self-tightening stuffing-box and new bucket which obviates the expense and delay of frequently dropping extra pumps.

WM. NANCE, Grass Valley, Nevada County, Cal.

tage of the reservoir site. The dam as proposed to be built will be 125 feet in height, but it can be extended to 150 feet if desirable. The reservoir site is an oval valley containing eight miles of land, ending in a narrow canyon with steep sides, and level and continuous bedrock, so far as inspected.

—Representative Loud has been making a strong effort to secure an appropriation of \$5000 for the survey of the harbor of San Francisco. Chairman Sayers of the Appropriation Committee was unwilling to grant this amount of money, but now he has made a proposition to Loud that he will direct the superintendent of the Geodetic Survey to make this survey and this would do away with the necessity of any special appropriation. Loud immediately acceded to this proposition and the survey will be made. Loud has also succeeded in getting the promise of \$10,000 for a coast and pilot chart of the whole Pacific Coast, to be issued monthly. Many petitions have been sent to Congress from California to secure the publication of this chart.

THE ORIENTAL GAS ENGINE



IS THE BEST, because it combines simplicity of construction with power and economy in space. It can be run with natural or manufactured gas or gasoline at a cost of 20 to 25 cents per horse power per day.

It can be used for pumping purposes, as well as for all purposes where a perfect engine is required, with the advantage of lessening the risk of explosion. No licensed engineer at a high salary needed to operate it. Send for circulars and prices if a good safe engine is what you need.

The Oriental Launch is Perfection.

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Inventor and Manufacturer,

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Cal. Debris Commission Notices.

THE CALIFORNIA DEBRIS COMMISSION having received applications to mine by the hydraulic process from Thomas A. Ide son in the Spanish Hill Gravel Mine, near Placerville, El Dorado Co., to deposit tailings behind a dam on the bank of Cedar Creek; from the El Dorado Water & Deep Gravel Mining Co. in the Spanish Hill Hydraulic Mine, near Placerville, to deposit tailings behind brush dams in Spanish Ravine; from Pascoe & Gruben in the Eureka Hydraulic Mine, near Placerville, to deposit tailings behind a brush dam on a flat; from John Blair et al. in the Mitchell Hydraulic Mine, near Placerville, to deposit tailings behind a rock dam in Spanish Ravine; from James Hackett in the Oriental & Thore Mine, near Rough & Ready, Nevada Co., to deposit tailings behind dams on the side hill and in a ravine; from E. B. Jacks in the Badger Hill Placer Mine, near Spanish Ranch, Plumas Co., to deposit tailings behind a rock dam in Spanish Creek; and from Tucker & Brown in the Grub Flat Placer Mine, near Spanish Ranch, to deposit tailings in an old hydraulic pit, gives notice that a meeting will be held at Room No. 32, Flood Building, San Francisco, Cal., March 27th, 1894, at 1:30 P. M.

Assessment Notices.

SUPERIOR MILL AND MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Placerville, El Dorado County, California.

Notice is hereby given that at a meeting of the Board of Directors held on the 13th day of March, 1894, an assessment (No. 1) of Twenty Cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary at the office of the company, Room 17, 318 Fine street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 23rd day of April, 1894, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 14th day of May, 1894, to pay the delinquent assessment, together with the cost of advertising and expenses of sale. By order of the Board of Directors. R. W. HEATH, Secretary.

Practical Hydraulics.

By P. M. RANDALL.

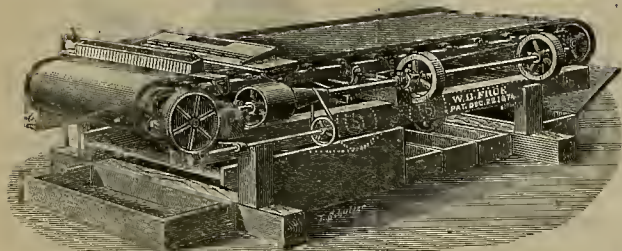
This new work is by one of the most experienced hydraulicians of the country. It abounds with useful tables for ready reference, in which the results of abstruse calculations are all placed in a form so that one can find what he wants in a moment. For the engineer the principles, formulae, coefficients, etc., are given; and for those not familiar with higher mathematics, examples, rules, and tables are prepared. Thus the needs of the scientist and the practical miner or millman are each met. It is the most complete work on the subject yet published, and is especially applicable to the Pacific Coast.

Table of Contents.

The following brief abstract of the contents will give an idea of the branches of the subject treated: General Plan; Discussion of the Principles of Hydraulics; Rules Deduced from Formulae Obtained; Examples and Calculations; Extensive Tables for Ready Reference; Fundamental Laws of Hydraulics Demonstrated and Expressed in Formulae and Rules; Flow of Water through Opening; Weir Coefficients; Triangular Weirs; Flow of Water over Quadrant Weir (tabulated); Application of Tables; Submerged Orifices; Flow through Orifices in Thin Partitions; Tables and Applications; Miners' Inches; Tables and Calculations; Flow of Water through Short Tubes and Compound Tubes; Flow of Water through Pipes; Tables of Velocities and Cubic Feet Flow for Given Fall per Mile and Diameter of Pipe; Coefficient for Bend—Circular and Angular; Flow through Nozzles; Inverted Siphons; Flow of Water in Open Channels; Extensive Tables; Rough and Ready Notes; Hints for Speedy and Approximate Estimates, etc. Price, \$2.00, post-paid. Sold by DEWEY PUBLISHING CO., Publishers, 220 Market St., San Francisco, Cal.

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Office of General Manager,
P. O. Address, South Riverside, San Bernardino Co., Cal.
CAJALCO, Dec. 18, 1891.

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I am, my Dear Sirs, Yours faithfully,
S. HARRIS, Manager.

Price of 4-foot wide Plain Belt Frue Vanner.....\$550, f. o. b.
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" 6-foot " Plain Belt Frue Vanner..... 800, f. o. b.

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MINING AND SCIENTIFIC PRESS.

An Illustrated Journal of Mining, Mechanics and Popular Science.

VOLUME LXVIII
Number 13.

SAN FRANCISCO, SATURDAY, MARCH 31, 1894.

Three Dollars per Annum.
SINGLE COPIES, 10 CENTS.

Combination Process.

The combination process is the method of treating gold and silver-bearing ores, by the application of the concentration and amalgamation process combined, and is especially adapted to ores that are not free milling.

It is not an experimental nor new process, but simply a combination of well-known and successful methods in daily operation throughout the mining sections of the country.

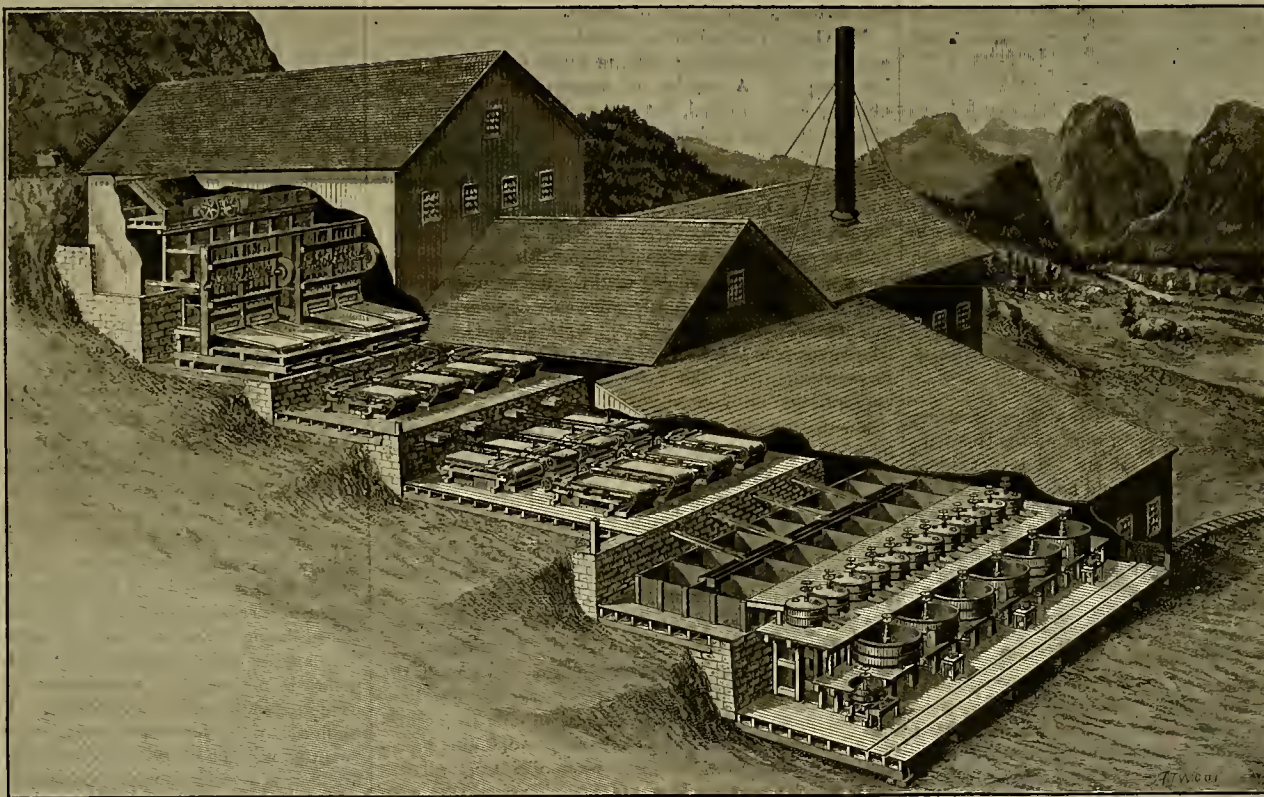
The mill which we illustrate herewith—made by the Union Iron Works—is designed to treat refractory ores

mines, and for such ores as we have described the combination process is not only cheap but a most practical method of reduction.

A COMPANY of Kansas City men, whose personnel is not given, has arrived at Oroville, Butte county, for the purpose of engaging in a river-mining scheme by a new process, whose nature is not explained. The members of the company are said to be men of large means who have thoroughly investigated the mining outlook and believe they have a bonanza. It is their intention to place the machinery in position as soon as possible. The land

the product of the United States will show an increase of \$4,000,000. There is also a gain of \$500,000 from Australia and \$500,000 from Russia. There is some slight shrinkage in other countries. The greatest relative gain in the United States comes from Colorado, the prominent contributors to which are the recently opened mines at Cripple Creek.

At a meeting of the Debris Commission on Tuesday, permits for hydraulic mining were issued to the following persons: Daniel W. Alhert for the Union mine and W. W. Lemmon for the Conduit Ravine mine. Both



TWENTY STAMP MILL, COMBINATION PROCESS.

carrying gold and silver associated with the baser metals, such as iron and copper pyrites, lead, zinc, antimony, etc.

The ore is first passed through the rock breaker or crusher into the ore bins, from whence it passes automatically into the self-feeders, which deliver it as required into the mortars of the battery. Here it is crushed wet and discharged through the battery screens upon silver-plated copper plates, which extract the free gold contained in the ore. From these plates it passes on to the first set of concentrators, where the heavier base metals are eliminated. The tailings from these machines then pass on to the second set of concentrators, where final concentration takes place, eliminating the zinc, antimony, etc. The tailings from this last set of machines, containing the sulphides, chlorides and fine gold, which can not be concentrated, pass into the settling tanks, where, after the surplus water is drawn from the pulp, it is shoveled into the pans, amalgamated, discharged into the settlers, and the amalgam strained, retorted and melted in the usual manner.

The concentrates obtained can be disposed of as may be best suited to the commercial conditions governing each particular case.

This process is being adopted by many of the largest

mines, and for such ores as we have described the combination process is not only cheap but a most practical method of reduction. Several river-mining plants have been placed in operation below Oroville during the past twenty years, but none of them have been very successful. The *Register*, in reporting the project, says it knows nothing of the merits of the contemplated plant, how the ground will be worked, or what the experience of the managers may be. But the land along the river banks is rich in gold, and if any plant was placed so as to drain the mines and get down to bedrock a great deal of gold could be extracted. About the bed of the river there is not so much confidence.

THE Director of the Mint at Washington has issued a preliminary statement of the gold product of the world for the calendar year of 1893. It shows a large increase over that for any previous year. It will be remembered that the same authority placed the gold product of the world for the calendar year of 1892 at \$138,861,000. It is now thought the product for 1893 will approximate \$150,000,000, or fully \$11,000,000 more than in the previous year. The greatest gain is from South Africa, whose product is placed at \$6,000,000 more than in 1892. It is also estimated that

mines are located near Brownsville, Yuba county. A permit was also granted R. M. Moorer for the Kelly Hill mine, in Butte county. The following mines were granted permits to construct dams: Spanish Hill hydraulic mine, Spanish Hill gravel mine and Mitchell hydraulic mine, all being located near Placerville. The Polar Star mine, in Dutch Flat, reported closing down, having accomplished all it can with its present impounding works. It will soon make application for permission to increase its ravine and dam and then resume work. The Hustler mine, near Cherokee, asked permission to begin operation, although its dam is not completed to its full height. The request was denied.

MR. JAMES SPIERS' communication on industrial education, found on page 206 of this issue, is a practical view of an interesting subject by a practical man. It advances sound views in a clear and convincing manner, and will afford much food for reflection. Mr. Spiers believes in theoretical education, but he believes more in the value of actual education—in hand work as well as head work. The two combined give us our most expert mechanics and engineers. One is essential to the other.

MINING AND SCIENTIFIC PRESS.

Office, 220 Market Street, Northeast corner Front, San Francisco.
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One inch.....	1.50	5.00	13.00	42.00

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THE low price of silver can hardly be regarded as a very desirable thing; still, it seems to have opened up a new avenue of industry to a number of very enterprising citizens of Omaha. It is no more nor less than the coining of silver dollars with precisely the same amount of silver and alloy as are contained in genuine dollars. The workmanship is reported to be so thorough as to deceive even experts. The profit to the minters of course lies in the seigniorage, which is over fifty cents. The government officers do not regard the new enterprise with favor, and are, in fact, hunting for the promoters for the purpose of taking them in custody.

THE sale of the Poorman mine in the Cœur d'Alenes for \$500,000, and the resumption of work on the Gem, are hopeful signs for lead and silver miners. It is not probable that so large an investment would be made unless the investors had strong grounds for believing silver or lead, or both, have seen their worst days. The Poorman mine is remarkable in many respects. It was located nearly ten years ago. It adjoins the Tiger, owned by S. S. Glidden, and is across the canyon from it. Scott Macdonald, now a citizen of Wallace, was the original locator. For three years it was involved in litigation arising from a conflict of boundary lines. The suit was finally compromised and the recent owners bought it for \$80,000. It has paid \$360,000 in dividends since then. That was clear of all expenses, and it is the most extensively developed mine in the Cœur d'Alenes. Patay Clark, who is now in Helena, has been manager ever since the purchase by his company. It has nearly four miles of underground work, besides extensive hoisting machinery and pumps and a concentrator. During flush times it paid good wages to 250 men.

THE Superior Court of Calaveras county has just rendered a decision of interest to miners, on the subject of relocation, in the case of Ayre & Danielson vs. O'Neil. The facts are substantially that plaintiff located a claim in 1880, and performed no assessment work until December, 1891, performing \$80 then, \$45 in January, 1892, and \$90 in December, 1892. Defendant relocated the property in July, 1892. The court held that it is a matter of no consequence to the case in question whether or not the annual assessment work was done between 1880 and 1892, so long as the original location was valid and the locators resumed work upon the mine before it was relocated; that the ownership of the mine was in the original locators until it had been relocated by other parties, and from the fact that they had resumed labor on the mine prior to July, 1892, and before any other parties had acquired title to the land, they were entitled to the whole of 1892 in which to do the amount of assessment work. Judgment is therefore given for the plaintiffs. After all the real issue was the question of fact. If the facts are as stated, the decision is undoubtedly in conformance with well-established and well-understood law.

Enforcing the Caminetti Law.

The enforcement of the penal provisions of the Caminetti law is at this time giving the Anti-Debris Association much concern; and it is proper to say that the miners themselves do not view the situation with entire satisfaction and are anxious for the settlement of certain questions of law which are in dispute. The trouble arises partly out of the controversy as to the proper method by which violators of the law are to be brought to justice, and partly out of lack of funds by the United States authorities to enter upon any campaign against illegal mining. It is worth while to recite the facts which have brought about the present situation:

Thursday of last week W. T. Phipps, president and manager of the Anti-Debris Association, accompanied by Attorney Devlin of Sacramento and Nathan E. Boyd, an agent of the association, called upon District Attorney C. A. Garter and requested him to issue warrants for the arrest of Ah You and Ah Joe, who have been mining in the county of Nevada by the hydraulic process. They alleged that the Chinese, on March 17, 1894, in the county of Nevada, wilfully, wrongfully and unlawfully mined by the hydraulic process within the meaning of the act of Congress entitled "An act to create the California Debris Commission and regulate hydraulic mining in the State of California."

It is charged that in the Red Diamond mine, located 14 miles east of Nevada City, the unlawful work was done. Earth and gravel were washed from their natural bank with a monitor and nozzle and discharged into Deer creek, which is adjacent to the mine. Deer creek conveyed the debris into Yuba river and thence into the Sacramento river, obstructing the streams by the formation of bars and interfering with the travel of vessels.

Mr. Garter listened to the complaints of the gentlemen and then informed them that he must decline to grant their request. A number of reasons were given by the attorney for his refusal, but as he declined to be interviewed upon the subject all of them could not be learned. The principal reason for declining to issue warrants is known to be because there is no money on hand with which to pay jurors and witnesses who are summoned to the United States courts.

If arrests are made for violations of the Caminetti law there will be a large number of them and such course will require the outlay of a considerable sum of money. Owing to the lack of funds the United States judges of this district have given the District Attorney to understand that he must not push the cases now on hand until another appropriation has been received.

For that reason, and also because the District Attorney is in doubt as to his right to proceed in the manner proposed by the Anti-Debris Association, he declined to order the warrants, but agreed to lay the matter before Attorney-General Olney for his decision. Mr. Boyd then went before United States Commissioner Heacock and swore to a complaint against the two Chinese, charging them with the violation of law already stated.

At last accounts the Chinamen had not been arrested, and it was not possible to tell just how far or exactly in what manner the anti-debris people propose to push the campaign. It seems to be clear, however, that they have decided to ignore the Debris Commission and its authority altogether, pursuing as closely as possible the precedents laid down some years ago when direct appeal was made to the courts. It would seem, however, that even from the point of view of the anti-debris people, the wise policy would be to lay their complaint before the Debris Commission and exhaust every resource, in the manner laid down by the Caminetti law, to secure its enforcement. It is clearly the duty of the commissioners to look after violations of the law, as witness the following section:

SECTION 19.—That an intentional violation on the part of a mine owner or owners, company or corporation, or the agents or employees of either, of the conditions of the order granted pursuant to Section 13, or such modifications thereof as may have been made by said Commission, shall work a forfeiture of the privileges thereby conferred, and upon notice being served by the order of said commissioner upon said owner or owners, work shall immediately cease. Said Commission shall take necessary steps to enforce its orders in case of the failure, neglect or refusal of such owner or owners to comply therewith, or in the event of any person or persons, company or corporation working by said process in said territory contrary to law.

It may be claimed that the Debris Commission has no funds to enforce the law, and appeal to them would be in vain. But it would be well enough for the Anti-Debris Association to obtain an official utterance from the Commission, proceeding in the manner required by law. As it is now, they are in the position of asking the enforcement of one provision of the law and desiring to avoid the operation of another. They demand that certain miners be punished for violating a provision which suits them, and decline to obey a provision which does not suit them. If all laws were observed in the manner pursued by these

people who have long demanded that the law make them secure in the enjoyment of their property, anarchy would result.

The Hoke Smith Decision.

THE PRESS recently referred to a decision of the Secretary of the Interior relative to placer locations, in effect requiring that discoveries must be made on each 20-acre tract in order to hold it. Says the Secretary:

In my opinion there must be a discovery upon each 20-acre tract included in a placer location of 160 acres, and a location made of that amount of land upon a single discovery is void, except as to the 20 acres immediately surrounding it. To constitute the law otherwise is to open the doorway for the appropriation of the public lands that would be doing great violence to the intent and meaning of the mining law.

The decision seems to contain all the bad law and injustice to the miners we feared. If allowed to stand, it must do serious damage to placer miners, and will render it very difficult, and even impossible in many instances, to carry on operations on a sufficient scale to make them profitable. The Anti-Debris Association has found an unexpected friend in the amiable Secretary of the Interior who seems to think it unnecessary to understand conditions and precedents in order to interpret law.

This remarkable decision emphasizes the justice of the plea of the miners for stronger and more definite recognition in the Government administration. The Secretary of the Interior is Mr. Hoke Smith, who hails from Georgia, just about as far remote from the great mining center of the United States as it is possible to get and not fall into the Gulf of Mexico. Doubtless the decision was written by some fourth-rate clerk who was never outside the District of Columbia, and who thinks a placer mine is some sort or device established solely by a beneficent Creator for litigation purposes, thus giving employment to an impecunious set of government interpreters who like necessity know no law; or, if they do, understand not its relation to right. It is regrettable that Mr. Hoke Smith has been compelled to father a decision of whose merits he knows nothing; and it is also regrettable that controversies which come before his department are not confined to the merits of watermelons or some other Georgia product, about which he may be presumed to have authoritative knowledge.

The Counties at the Fair.

It is the purpose of the PRESS to give adequate notice, during the continuance of the Midwinter Fair, not only of the exhibits of the various counties, but of the various deserving kindred displays of mechanical and metallurgical appliances now in the Mechanic Arts building. The notices of the county exhibits which have already appeared have excited favorable attention in the various counties as being fair, complete and accurate, and other articles will be up to standard. It should be distinctly understood that no charge is made for these notices. It is both the pleasure and the duty of the PRESS to promote the mining interest by all means in its power, and it conceives that it would not be furthering that end if it did not furnish reliable and timely information at all times concerning mines and mining. It ought to be said here that any so-called mining paper which has any other policy is not fulfilling a laudable mission. Such papers have no standing and less influence. Their circulation is confined to the few copies which the counties which are "written up" purchase and distribute. Counties or exhibitors who refuse to pay are ignored. The articles are inspired by no motive except that of gain, and are, as a rule, incorrect, unreliable and unconvincing. They do more harm than good. As a case in point it may be mentioned that an obscure paper is now attempting to "work" the various counties by methods which may properly be termed blackmail. It is gratifying to know that it has not met with success.

ORDERS were posted at the Gold Bank, Forbestown, last Saturday, announcing that the Sunday shifts would be suspended and no more work would be done in the mine on Sunday hereafter than was absolutely necessary. Also that the change of shifts from day to night would be made every week instead of fortnightly as heretofore. This order does not apply to the millmen, only so far as the weekly change is concerned.

THE first bar of bullion produced in this section from Ferguson district ores was shaped at the Hiko mill on the 28th ultimo, its value being a little over \$3000, says the Pioche Lode. The following day the Condor mill retorted a bar valued at about \$14,000, and yesterday the Hiko mill retorted another bar valued at about the same as the first. This makes a total product of about \$20,000.

THE expected happened, and the President to-day (Thursday) sent to Congress his veto of the Bland seigniorage bill.

California Mines at the Midwinter Fair.

Calaveras County.—Calaveras, to which belongs the honor of having the largest producing gold mine in the State, is finely represented at the Midwinter Fair by a display of ores from its working mines, and other natural products, designed to show the varied mineral resources of the county. There are features to the exhibit which are unique, and which attract the favorable comment of many visitors. The essential idea of the collection was to display the character of gold and copper ores, and this plan has been carried out most successfully. Occupying a conspicuous position are two tons of quartz from the famous Utica mine at Angels—a mine more talked about than any other in California during the past two years, and a mine, further, that by actual working results shows that it deserves all its fame. According to authentic report the Utica produced during the year 1893 upwards of \$1,000,000, exceeding the record of the Kennedy in Amador county, the next largest producer by about \$400,000, and surpassing the best California record for 1892 (the Kennedy's) by over \$500,000. It may be said in passing that the Utica is one of the most noticeable instances in mining annals of the successful reopening of an abandoned mine; and, besides, its greatly increased production for 1893 finely illustrates the increased interest in gold mining in California and gives substantial promise for an active and prosperous future for the entire industry. The Utica, which is a consolidation of two or three claims on the same vein on the mother lode, is opened by three shafts, which are down from 500 to 900 feet. Development may be said to be carried on all over the mine. The vein at one point is *eighty feet wide*, probably the largest true ledge in any gold mine in the United States. The quartz varies in value from \$3 to \$60, and is both free milling and sulphureted. Sulphurets, as a rule, run very evenly from \$40 to \$70. At the Utica mill 60 stamps are dropping; at the Stickle, 60 stamps; at the Madison, 40 stamps; making a total of 160 stamps crushing ore for the Utica Company—the largest in California, and, except the Alaska-Treadwell, the largest on the Pacific coast. The ore shown in the Calaveras exhibit is the average ore taken from the mine. It is typical mother-lode quartz.

The second important display is copper ore in its various forms from the Union Copper mine at Copperopolis, and the Campo Seco and Satellite mines at Campo Seco. The Penn Chemical Works are owners of the latter two mines, and their exhibit is designed to show copper from the ore to the ingot, with sulphate, sulphide and carbonate copper ores. Copper cement, from which mineral paint is made, is also shown. As a matter of fact the Penn Chemical Works are now devoting their entire efforts to producing copper cement, no work being done in the mines. Thousands of tons of ore are now on the dump, sufficient for the purposes of the reduction works for some time to come. The display of the Union copper mine is of much the same character, and is alike creditable and interesting. One curious difference in the ores from these two mines—which are doubtless on the same ledge, though 20 miles apart—may be noted. At Campo Seco the ore carries about \$3.50 in gold and 18 ounces of silver to the ton; at the latter there is no trace of the precious metals. The vein at Campo Seco approaches the mother lode, and it is probable that the same influences which deposited gold and silver in the lode were also felt at Campo Seco. From the Copperopolis mine also comes very richly sulphureted ore taken from the Royal Consolidated (formerly the Pine Log) mine. The display of gold ores from this mine, near the Campo Seco district, shows very well the variety of the mineralization of the district.

One interesting display is a collection of quartz from the Carson Creek (Jones) mine, three miles from Angels. It may be remembered that a recent assay of ore from this mine showed the value to be \$30,000 per ton. Of course it is not pretended that this is the average ore, but it appears to be certain that the mine will be remunerative. It has been closed down for quite a long time, but an energetic company now has possession and development is being pushed.

Two very large pieces of crystallized quartz from the McSorley brothers mine attract a deal of attention. One weighs about 100 pounds. They are really very fine specimens, being the largest and among the clearest in the entire mining exhibit.

Seven hundred pounds of quartz from the Lone Star mine and 300 pounds from the Reed & Hillery mine, both in the West Point district and operated by the Hurley Mining Company, are prominently shown. A peculiarity of these ores is the presence of free milling alongside very rebellious ore—so rebellious that it must be smelted. However, the ore is rich, at times running as high as \$600.

Other collections of quartz which are deserving of special mention are to be found in the summary. From the

Moser mine, free-milling rock of a very fine quality is on exhibition. It is said that Gen. Alger of Michigan was especially attracted by this exhibit and asked permission to take back home one of the specimens.

A conglomerate quartz from the Flour Sack mine has excited a good deal of comment among experts. The ore is very rebellious and has to be sacked and sent to Selby's for smelting. The mine is idle now, this method being found too expensive.

An exhibit of gypsum shows the possibilities of Calaveras in that line. It is said to be from a "whole mountain" of gypsum, whose development would probably be remunerative.

Obalk from the Jesus Maria district, Jos. Del Orto owner, is a very pure and clear, and is altogether one of the most attractive specimens shown. Two exhibits of iron ore come from deposits owned by May Bros. and George Blay, in the same district.

Terra cotta clay, from the Campo Seco district, is of fine appearance and is said to have high value. The deposit is being gradually developed by Mr. Wilbur of Stockton, owner of pottery works, who says it is as fine as any that comes from Italy. It is the only display of the kind made by any county. Sandstone from the Campo Seco district may be used for building and ornamental purposes, and gray marble from the O. J. Cantwell quarry, San Andreas district, takes a high polish. Development of this quarry has just begun. White marble of good quality from San Andreas, A. F. Treat owner, is also shown.

A display of tuff stone, by the Campo Seco Building Stone Quarry Co., M. A. Edwards manager, attracts much attention. A part of this exhibit was at the World's Fair.

It ought to be said that the Calaveras exhibit was collected through the efforts of the executive committee appointed by the California Miners Association. They received no financial aid from the county; but, being possessed of a large fund of local patriotism, and being also convinced of the merit of Calaveras mines and the value of a proper display at the fair, they undertook the work. Mr. Foreman individually superintended the installation of the exhibit, and is constantly on hand to point out its special features to the numerous visitors, and he does it with intelligence and a due amount of enthusiasm. With other members of the committee, he is certainly deserving of the praise of Calaveras county miners for the really fine display he has succeeded in making. It is to be hoped that the Supervisor of Calaveras county will yet see their way clear to make an appropriation for the maintenance of the exhibit, and for the addition of other features which would add a great deal to the value.

A summary of the Calaveras exhibit may be found in the following:

Free gold ore from the Lone Star, Reed and Hillery, Utica, Royal Consolidated, Moser, Jacobs, Flour Sack, Mount Timolas, Sandy, Lindner, Robinson, Sparrow Hawk, May Brothers, Venns, Fisher, Blay, Leota and Scotia mines; copper ore from the Union mine at Copperopolis, tuff from the Campo Seco district, quartz crystals from the McSorley mine, gypsum deposit from the Davison mine in the Rich Gulch district, chalk from the Del Orto mine, manganese ore from the May Brothers' mine, gray marble from the Campo quarry and Cantwell quarry, terra cotta clay and sandstone from the Campo Seco district. The Penn Chemical Works has a display of copper in the several stages from the ore to the ingot, including sulphate and carbonate ores, the roasted ore, solution and cement; also ingots of refined and casting brand.

Foundry Notes.

Five Woodbury concentrators have just been sent to Colorado.

The big quartz mill at the Fair, erected by the Joshua Hendy Machine Works, has been put in operation. The mill occupies a corrugated iron building erected for it just opposite the western entrance to the Mechanic Arts building. The complete process of extracting gold from the rock is shown, and it is needless to say that crowds of visitors lingered in the building during the afternoon despite the fact that the roar and pounding of the stamps was almost deafening and disastrous to the nerves. The mill is operated by H. G. Murray, a practical Amador county mining man, and he proposes to run it every afternoon from now on. Gold-bearing quartz is used in demonstrating the process, which makes the exhibit all the more interesting.

A detachment of Royal Marine Artillery, numbering 75, has arrived in Montreal en route to Esquimalt, B. C., where, on arrival, they will be set to work on the new fortifications upon which Great Britain has resolved to expend \$5,000,000. The work will occupy two years and will be carried to completion with all secrecy. The small peninsula between Esquimalt and Victoria harbors is to be made impregnable to attack from the sea and practically so from the land. The fortifications are projected to extend from Point MacAnley all the way to the head of Esquimalt harbor, literally encircling the latter, its navy yard, imperial dry dock, magazines and storehouses. A system of great tunnels will connect the pits and magazines. The guns will be worked on the elevator principle. At intervals tremendous wells are to be built, in which will operate by hydraulic power and electricity large elevators bringing from the ground batteries of artillery and crews to operate them, and sinking with men and guns back into the earth as soon as the guns have been fired.

Sliokens.

The Gem mine in the Cour d'Alenes has resumed, giving employment to 110 men.

Thirty dry washers have been made in Porterville for men who intend to go to the Goler mines in Kern county.

A special to the Salt Lake Tribune from Rock Springs, Wyo., says that a rich vein has been discovered near Lewiston in the South Pass country.

There are strong probabilities that active work will soon be commenced on the property of the Ohio Gold Mining Company, situated on the San Joaquin about five miles up the river from Polasky.

I. W. Willsay, a miner, while prospecting in an old mine, 150 miles from Enreka, Nev., struck a stick of giant powder. The powder exploded, terribly lacerating him. He was taken to Sacramento. He will lose both eyes.

Colonel S. A. Estes, largely interested in mining interests, died suddenly at Salt Lake on Sunday. He came from Montana about a year ago, and was putting up a large copper smelter in Salt Lake.

The Sunree Gold Quartz Mining Company has been incorporated. Principal place of business, San Francisco. Capital stock, \$1,000,000, with E. H. Baxter, George F. Hill, D. J. Halloran, E. T. Baxter and James P. Sweeney of San Francisco as directors.

The prevailing opinion is that John R. Tregloan will be selected superintendent of the Wildman mine, vice John R. Tregloan Sr., resigned. Mr. Tregloan Sr. and his wife expect to take a trip East during the spring, and upon their return will reside in Alameda.

The gold fields of the Rainy Lake district, along the northern boundary of Minnesota, will attract a great crowd of people when spring is fairly opened. The latter part of the trip is made by stage from Tower, on the Vermillion Range, or Mountain Iron, on the Mesaba Range.

Several gold, silver, copper and iron mines near Bozeman, Montana, have just been purchased by George W. Ballou, who represents a syndicate of New York capitalists. The price paid was \$1,000,000. The mines will be extensively developed and large concentrating works will be erected.

The Golden West Mining and Machine Company has been incorporated. Principal place of business, Berkeley. Capital stock, \$1,000,000, with Henry Golsch, Charles Hadlan and C. H. Spear of West Berkeley and William Frey, Fritz J. Kaeser, Arnold Kaeser and R. Kaeser of Sacramento as directors.

President J. P. McBurna of the United Mine-Workers of America has issued a circular calling for the fifth annual convention of the organization to be held at Columbus, commencing April 10. A great strike is said to be contemplated. There are in America 100,000 miners who are attached to the United Mine-Workers' Association.

The gold production in Montana during January and February, and thus far in March is said to be double that of last year, and the prospects are that the production for the entire year will be more than double that of 1893. The silver mines, of course, have closed, but the copper mines are employing the same number of men as formerly, and gold mining has taken care of large numbers of the unemployed.

A dispatch from Albuquerque, N. M., says that phenomenal strikes in the Cochiti mining district have set New Mexico wild, and the prospectors are pouring into Cochiti from all directions. J. R. McCowan of Albuquerque has just received an assay from a large sample of Cochiti ore which runs very high in gold and silver. Some ore leads are immense on the surface, and the mineral is quarried from the cuts in some instances forty feet wide.

Savannah days ago Mr. John Stocks, foreman of the blacksmith shop at the Empire mine, had an offer to go to Johannesburg, South Africa, to accept a similar position to the one which he now occupies, says the Grass Valley Telegraph. Mr. Stocks has been connected with the Empire, in his present capacity, for years, and he is considered one of the very best men in the business. It is not likely that Mr. Stocks will go, as Grass Valley is his home.

When the main shaft of the Bronze mine at Vanderbilt reached a point about 50 feet below the level last week, Foreman Sauerbrey noticed that the ore was of a different character and took a specimen to the surface, which, when assayed, showed a value of \$1118.83 per ton. The next day he took two samples, which he selected carefully in order that he might get only an average. These two samples, with the other, made an average of \$542.62 per ton in gold.

Goveanoa McConnell, of Idaho, is investigating the case of State Mining Inspector W. S. Hoskins, charged with gross neglect of duty in the recent Bunker Hill and Sullivan mine accident. In a letter to Governor McConnell, G. F. Whelan, secretary of the executive committee of the Miners' Union, says that the mine in question is a death trap and that this fact has been repeatedly brought to the notice of Inspector Hoskins, who paid no attention to the warning.

Winnsa A. Kaasar, a mining expert, has been arrested in this city on warrants charging him with obtaining \$1500 by false pretenses. The complainant is Dr. Ruth E. Newland, and the arrest is believed to be the outcome of a long-continued dispute over the ownership of the Jupiter gravel mine, near Angel's Camp, Calaveras county. Keefer was released on \$3000 bonds. He was extremely wroth over his arrest, and denounced the complainant in round terms, also accusing her of various unlawful actions in connection with the disposition of certain stock in the Jupiter mine to which she claimed ownership.

The annual report of the Osceola Copper Mining Company of Michigan shows that the cost of producing 6,715,870 pounds of refined copper at the mine in 1893 was 7.26 cents per pound, against 7.20 cents in 1892 and 7.63 in 1891. About 21 cents must be added to cover lay down cost in New York. The net income last year was \$102,448, and \$100,000 was given in dividends. The dividends for the previous two years were \$150,000 per annum. The Kearsage reports the cost of producing copper in 1893 at 9.32 cents, against 9 1/2 cents in 1892 and 8.84 cents in 1891. The Atlantic produced copper at 9.42 cents in 1893, against 11.90 in 1892.

A Practical Talk on Mining Geology.

By Taylor D. MacLeod.

"Knowledge is proud that he has learned so much;
Wisdom is humble that he knows no more."

There is a prevalent fault among mining men of limited experience in territory and practice, who claim that good mines can only exist under the local geological conditions they are personally familiar with.

Again, a man may be ever so good a metallurgist and have but a superficial knowledge of mining geology. His really meritorious ability in his special field may cause him to overlook the somewhat common-place fact that "the world do move"—that, in short, the point of the miners' pick has broken through the cap-rock of ancient lore and exposed the pay mineral of a wider knowledge.

The practical application of theoretical learning, supplemented by actual contact and practice in the field, makes the really competent mining geologist. This knowledge may have been acquired in the schools or may be self-taught, it matters not. Untold, they are a more perfect unity; divided, their adherents are apt to be stubbornly bigoted. The solely practical man ridicules "the fine-spun theories of the other side and gives ocular proof of the errors of the purely book savant. The theoretical scholar, serenely and with a half-suppressed smile of contempt, dismisses the arguments of his brother geologist of the pick with a few well-groomed phrases. Neither are right; both are wrong in a degree; the happy mean between these two. Extremes have been and are congenial, and the mutual interchange of experiments and discoveries of a mechanical, metallurgical or geological nature is producing that superior class of safe mining men peculiar to this western country.

Two Types of Mining Operators.—The older text books tell us we may not look for the precious metals in granite or limestone, and that they cannot exist in sandstone! I had thought these opinions were relegated to the dim and misty past, and had become as the "memory of a far-off dream," but I find them here, in this city of mining centers second to none in the land, a living factor governing somewhat the investment of capital in mining properties. A certain professor, eminent as a metallurgist, who has, it is said, a wide experience in mineral formations, advised an acquaintance of mine "to have nothing to do with mines of the noble metals that occur in a granite formation; that they were not and could not be persistent—go down—in depth!" This is certainly rough on the Anaconda and Granite mines of Montana, at the north, and the Congress gold mine of Arizona to the south, the latter with a record of \$10,000,000 produced. It was sold, a few days since, for \$1,250,000. Others could be cited *ad infinitum* as examples where the inclosing walls and country formation are of granite. Yet, despite the verdict of our learned brother, they will doubtless continue their regular dividends.

"There are more things in heaven and earth, Horatio,
Than are dreamt of in your philosophy."

Again, a certain literary miner, to the manor born, in my hearing voiced it as *his* experience "that a permanent gold ledge did not exist unless at least one of the walls was of slate, nor did he believe it could be found." Now this information—like the limber-jawed youth who so flippantly dispensed it—was quite refreshing. Wise in his generation, he confined the assertion to his personal experience, but should have stopped there.

A slate wall is a very desirable condition in a gold mine. none could be better; but if only those mines in a slate, or slate contact were producers of the yellow metal the bi-metallic problem would soon be solved, for there would not be nearly enough gold produced for the arts. The moneyed novice in mining affairs is generally a good single-banded listener, and such wild assertions as quoted above may result in harm.

Formations in Which Permanency May Be Expected.—Given a competent knowledge of terrestrial magnetism, in its bearings on minerals, the formations and fillings of veins, and, in short, the whole phenomena of geology in its relation to mining, it is impossible to form a correct opinion of any new and unexplored ground; and a reflective man will not advance an opinion on a territory or formation of which he knows nothing. Experience has shown that for permanent mining the older the rocks are, the better the prospect for deep and lasting works. It was the opinion of the late Sir William Logan that the gneiss of the Laurentian system was the oldest in the world, and every member of that ancient family refers us back to time so remote that time is too short a word to express our conception of duration. No *true vein* in those Laurentian granites, or their equivalents, the crystalline slates, will ever run out in depth. They may be profitably worked until water or some other unavoidable cause may make it too expensive.

Porphyry is an essential constituent, either as wall rock

or forming a dyke in connection with most, if not all, large bullion-producing mines. The great Comstock of Nevada was encased in a greenstone porphyry, called propylite, and it has been observed that when this porphyry runs out or ceases to exist, the mineral becomes low grade. Forty per cent of the value of these ores was in gold. At Nagybanja, in the mines of Transylvania, where large amounts of native gold and silver are produced, the rock is all porphyry. The richest mines in southern Siberia are in syenite and porphyry. The gold-bearing conglomerate reefs of Johannesburg, South Africa, are in quartzite. Limestone and quartzite contact walls, in a porphyry country rock, enclose the Vulture and Harqua Hala mines of Arizona. A brown sandstone is the matrix richly impregnated with silver at Silver Reef, Utah. Hence experience has finally taught us that the practical miner is correct in his statement that "silver is in veins and gold is where you find it."

How Little We Know.—And it comes to that, pray how much do any of us know, *practically* always, of the origin of metalliferous veins; and after separating each and every constituent element from an ore, knowing the percentage of each, who can return that rock with its minerals to its original condition? Sublimation, infiltration or any other *tion* is simply conjecture. Have our scientific experts read the riddle of that huge pipe vein, the Silver King of Arizona, or how came that peculiar and rich chimney of ore, the Bassic mine of Colorado, with its sheep-horns incrustated with silver chloride 70 feet down in the solid vein and numerous chunks and fragments of charred wood to the 300 level? True, we have many learned papers, by really scientific men, on the Bassic mine, but they don't agree, and I think we may sum it all up in the stanza by Pope:

Pretty in amber to observe the forms
Of hairs, or straws, or grubs, or worms!
The things we know are neither rich nor rare,
But wonder how the devil they got there.

When ore is out of the usual character, we simply experiment, and we have advanced but little in the absolute saving of the precious metals over the old Spanish or Mexican processes of a century ago. Great progress has been made in the mechanical department of ore manipulation, whereby we may handle tons where pounds were treated in days long since; but in actual metallurgy we have advanced but little. To the casual reader this may be rank heresy, but it is cold-blooded truth nevertheless.

Distinct from the average calling, there are no graduates in the school of mining, geology and metallurgy. Again, different from other lines of research, the vast possibilities and comparatively slow advance made does not discourage the student, but rather enthralls him with a glimpse of yet more to follow in the hoped-for near future.

For 62 years that eminently practical scientist, Prof. Melville Attwood, has wrestled with problems in applied metallurgy and the geology of mining. An enthusiastic student and clever resourceful experimenter, he said to the writer the other day: "Oh, my dear sir, the span of human life is too short and there is so much to learn."

A valuable paper on the origin of metalliferous veins by Prof. Attwood should be widely circulated and read by practical mining men when it is given out for publication. Let the reader compare the utterance of this veteran life student and active worker in the field of mining with the recitals of the average Jonah's gourd variety of mining expert, and the application of the lines introducing this letter is plain.

TAYLOR D. MACLEOD.

The Cripple Creek District.

A descriptive pamphlet of the Cripple Creek district, Colorado, just issued by J. W. Prouditt & Co., of Colorado Springs, will make interesting reading to all, especially to those whose attention has recently been particularly directed to the district by the mining troubles.

The district is near the base of Pike's Peak, 20 miles southwest from Colorado Springs, 44 miles from Pueblo and 70 miles from Denver. It consists of rolling hills, sparsely wooded, and small valleys and gulches. Gold has been known to exist there since 1859. No work of any importance in the way of prospecting the district was undertaken until 1861, though a tunnel in Aregna Creek was run in 1874, and in Poverty Gulch in 1879, both of which enterprises were unfruitful.

It was not until February, 1891, that any serious attempt was made to develop the district. Of course, some months passed before there were any tangible results. Several locations were taken up, and on some of these ore was found. As the facts came out, people were attracted thitherward, and by the end of 1892 there were estimated to be 2000 people on the ground. The output of gold in the district for 1892 was about \$600,000. Still greater progress marked the year 1893. Cripple Creek now has a population of 7000, a complete system of waterworks, an electric plant, two banks, ample hotels, and nearly all the conveniences of a town of that size—all practically the

outgrowth of two years. The bullion product of the district last year was \$2,463,500, an increase of \$1,800,500 over 1892. There is every reason to believe that the output will be larger this year. In 1892 there were 8½ miles of development—shafts and drifts—and in 1893 there were 7½ miles more added. There are 26 steam hoisting plants in operation against 5 at the end of 1892. Scores of locations have been made, but most of the bullion last year came out of half-a-dozen claims.

The metal output of Colorado for the past two years was as follows:

	1892.	1893.
Gold, ounces.....	267,538	401,307
Silver, ounces.....	26,542,135	25,304,750
Lead, tons.....	61,572	46,179
Copper, pounds.....	4,666,450	5,133,095

In 1892 silver was estimated at 86.8c per ounce, copper at 11c per pound, and lead at \$81 per ton. In 1893 silver was averaged at 77c, copper at 10c, and lead at \$72.30. Gold is figured at \$20.67 per ounce. Based on these figures, the metal product of Colorado for 1892 was \$34,059,229, and for 1893 \$31,621,742. According to these figures, the gold output of Colorado last year was \$8,295,016, against \$5,530,010 in 1892, most of the increase coming from the Cripple Creek region. W. F. Hendrick, an enthusiastic member of the Colorado Mining Stock Exchange, says: "The Little Johnny and Leadville mines at the new camp at Balfour are producing more gold than the great Treadwell mines. Over 50 wholly new gold mines have been established in 21 counties." These statements are certainly of an encouraging character, whatever may be the output at the end of the year.

Counting One Million.

They started in to count \$1,000,000 in worn silver coin at the Mint on Friday and will probably be at the task for a week or ten days, says the *Examiner* of March 25th. The money comes from the Sub-treasury, and the order for its transfer was made by the Treasurer at Washington.

The intention is to recoin it—an operation which will result in a loss of \$20,000 to the Government. The silver pieces had, however, become what is termed "uncurrent," and had accumulated at the Sub-treasury for a score of years until they had become a nuisance. They consist of halves, quarters, dimes and 5 and 3-cent pieces. Some of them would make the heart of the numismatist throb with envy. The idea of turning into the melting pot 50-cent coins going back nearly to the beginning of the century, 3 cent pieces which have not been struck since 1873, and twenties which were born in 1877, only to die within a couple of years, would drive him to despair.

The first consignment of \$100,000 of these coins was taken to the Mint yesterday morning in sacks of \$1000, whatever their denomination. They were then transferred to the south adjustment room, where 16 women were called in to count them, for in their abraded condition, weight would serve no criterion as to their value. Chief Clerk Robert Barnett looked out for the interests of the Mint and Cashier Thomas P. Burns watched over those of the Sub-treasury, of which he is general manager. The women were seated at three rows of stone-covered tables. Each was supplied with a wooden tray, a sack of \$1000 was dumped out between every two of them, and the counting began.

They did not find it agreeable work. They have been accustomed to handle clean, new coin from the dies. That which they had to handle yesterday was worn and dirty. Not only that, but the piles of coin would not equalize, except approximately, and great care had to be exercised in counting it. About two-thirds of the coin consists of halves, the remainder being made up of pieces of smaller denominations. The three-cent pieces were first taken up. There was only five dollars' worth of them. Then came the turn of forty dollars' worth of 20-cent pieces. Halves and quarters followed, alternatively, as handling one set of money for a long period becomes very painful to the counter.

Yesterday's work commenced at 10:45 o'clock and continued until 4 o'clock in the afternoon. Hereafter, however, the counting will be carried on from 9 A. M. until noon and from 1 to 4 P. M. until the task is finished.

A DOZEN MINERS have just sailed for Cook's inlet, Alaska, on the schooner Melancthon. Reports from Alaska are that wherever black sand is found in the neighborhood of Cook's inlet gold is obtainable. The source of this fine gold has been traced to the placers on the streams 40 or 50 miles from the inlet. One station lies 830 miles above Sitka; it is off the steamer route and distant from the lines of travel to the Yukon gold fields. Its isolation is the reason that so little has been known about the gold-bearing sands and placers of that portion of Alaska. One trouble with which the prospector has to contend is that there is no surface showing of mineral, no outcropping visible, as in California and the Rocky Mountain States and Territories. The whole country is covered with a heavy growth of moss, which has to be raked off before the prospector can begin work on the gravel which lies beneath.

Silver-Lead Smelting Practice.

In Two Parts—Part I.

Walter Renton Ingalls in *Engineering Magazine*.

One of the most important factors in the great increase in the production of silver in the United States during the past ten years has been the improvement in the silver-lead smelting works and their processes, which, together with the extension of railways through the Rocky mountains, has made it possible to treat ores that formerly could not be mined at a profit. The advance made in this direction has been so far-reaching in its results that the methods of silver milling, like amalgamation and lixiviation, which belong distinctively to the metallurgy of silver, have fallen off notably in relative importance, and now more than half the silver turned out in the United States comes from argentiferous lead ores and those smelted with them. On the other hand, the lead industry has become more interwoven with silver mining, until, out of the 620,000 metric tons of the baser metal that were produced in the world in 1892, much more than half was derived from silver-bearing ores. In the United States alone the percentage was higher, only about 20 per cent of the whole product coming from the producers of soft lead in the Mississippi valley.

The silver-lead smelting industry in the United States is of comparatively recent origin, the first successful works having been erected in 1867 at Argenta, Mont., where argentiferous galena ores were reduced in small blast furnaces, each furnace treating from two to five tons of ore per day. Two years later the great silver-lead deposits of Enreka, Nev., were opened and furnaces were erected at that place. In 1870, works were established at Salt Lake City, Utah, to treat the ores mined in Bingham and Cottonwood canyons. From these beginnings the American practice of silver-lead smelting has been developed.

The second stage of the industry dates back to the opening of the great bodies of lead carbonate ore at Leadville, Colo., in 1878, which was followed immediately by the erection of smelting works at that place, where in 1880 there were 13 plants in operation (three more being out of blast), which produced 36,000 tons of lead, or nearly 35 per cent of all that was turned out in the United States in that year. The Leadville works of this time were much superior to those of Eureka and Salt Lake City of ten years previous, a better type of furnace having been introduced and the methods of smelting having been improved; but both the cost of smelting and the losses in metal were still high, and the defects of these works in comparison with the model plants of the present day would be apparent even to the layman.

A noteworthy feature of the silver-lead smelting industry of the United States during the first 15 years of its history was the multiplication of small plants in the immediate vicinity of important mines. Few of these remained long in operation, owing to exhaustion of the mines near which they were located or inability to meet the competition of the larger and more economical plants that were built subsequently, and the policy of erecting works at isolated points, or for treating ores of individual mines, is now recognized to be unwise. The ruins of such works that are to be found scattered through the Rocky mountains are monuments to one of the steps in advance in the practice of lead smelting in the United States.

About ten years ago lead-smelting works were established at Denver and Pueblo, in Colorado, at the foot of the Front Range of the Rocky mountains, and with the growth of these began the third and final period in the development of the industry in the United States. These works were so located that they could command the ores from many districts through the branches of the railway systems at whose centers they were built, and they were thus able to obtain better and more profitable mixtures for smelting than the isolated works in the mountains, which were dependent upon single groups of mines. They had the advantages, moreover, of cheaper labor, cheaper fuel and fluxes, cheaper supplies and cheap freights on ore from the railways, which were interested naturally in concentrating the industry at points giving them the most carriage. The smaller and less favorably situated custom works could not stand the competition with the new valley smelters, and one by one were forced to close down, with the exception of a few of the Leadville works, those at Salt Lake City, which occupy a more or less central position, and a few others.

The refiners of silver-lead bullion, established chiefly at Omaha, Argentine (Kansas), St. Louis, Chicago, Mansfield (near Pittsburg), Newark and San Francisco, also have smelting departments, and some of them, especially the three first mentioned, handle considerable quantities of crude ore. There is a close connection between most of the smelting and refining companies, and the base bullion produced by the former is turned over to the corresponding refining works; so the en-

tire treatment from smelting the crude ore to marketing the refined products is done practically by the same concern. Thus all the bullion of the Colorado Smelting Company, of Pueblo, and the Montana Smelting Company, of Great Falls, goes to the National Smelting and Refining Company, of Chicago; that of the American Mining and Smelting Company, of Leadville, goes to the Chicago and Ancona Smelting and Refining Company, of Illinois, and that of the Mingo Smelting Company, of Salt Lake City, goes to the Pennsylvania Lead Company, at Mansfield. The great Arkansas Valley Works at Leadville and the works at El Paso, Texas, are owned by the Consolidated Kansas City Smelting and Refining Company, which refines all its bullion at Argentine. The Omaha and Grant Smelting and Refining Company and the Pueblo Smelting and Refining Company refine their own bullion at Omaha and Pueblo, respectively, and the Globe Smelting Company has recently established a department at its works in Denver for the same purpose. This affiliation between smelting and refining companies, and the erection of refining works (formerly grouped on the Atlantic coast, with the exception of one on the Pacific) further west, and at the smelting works themselves, has been one of the important tendencies of recent years, being the natural sequence of the concentration of the smelting works. All of the refining companies buy also bullion from outside works, including those of the Republic of Mexico, about 13,000 tons of bullion from the latter having been desilverized in the United States in 1892.

In theory the smelting of argentiferous lead ores is extremely simple, but like most metallurgical processes it is more intricate in practice, wherein extraneous complications enter. There are various methods of smelting, but in the United States only one—roasting and reduction—is in common use. The lead in the ore has first to be oxidized by roasting, if present originally in the form of sulphide (galena), but, if already oxidized (as in the case of the Leadville carbonates), of course no preliminary treatment is necessary. It is then charged into a shaft-furnace together with a certain proportion of limestone, oxide of iron, and fuel, which may be charcoal or coke or a mixture of both. The iron and limestone are added to the ore for the purpose of making a fusible slag. Descending in the furnace the carbonic acid is first driven from the limestone and ore; at a lower zone the charge fuses, the iron and lime combining with the silica of the ore to form a double silicate of iron and lime, while the oxide of lead is reduced by the carbon of the fuel, with the formation of carbonic-acid gas and metallic lead, which collects the gold and silver from the ore and trickles down into the bottom of the furnace, which is called the crucible. The molten slag, being much lighter than the lead, floats on top of it, and is separated by tapping from the furnace at a higher level, the method varying in detail in different types of furnaces.

This is the general principle of the roast-reduction process of lead smelting, but in practice there are important modifications. Thus part of the lead ore is sometimes fused on a reverberatory hearth previous to smelting in the blast furnace, whereby the lead is converted into silicate, in which form it is charged instead of oxide. Furthermore, it is not economical to oxidize all the sulphide ore, galena, and pyrite, and the furnace charge always contains sulphur. Then there are other metals in the ores, such as copper, arsenic, and zinc, and earthy materials, such as magnesia, baryta, and alumina, which have to be disposed of, and the proportions of iron, lime, and silica in the smelting mixture have to be adjusted so as to effect this. The sulphide and silicate of lead are decomposed by iron with the precipitation metallic lead. The bisulphides of iron and copper are reduced by iron to monosulphides, forming a matte, so called. The arsenic also combines with iron as arsenide of iron or speiss. The matte and speiss, both of which carry gold and silver, are heavier than the slag and lighter than the bullion, sinking consequently to a level in the crucible between the two. They are usually drawn off with the slag, however, and separated from it outside of the furnace, after which they are subjected to further treatment (roasting and resmelting) for the recovery of their metallic contents. The earthy oxides, like alumina, baryta, and magnesia, which commonly occur in lead ores, are taken up into the slag as silicates. Zinc, which is the foreign element most dreaded by the lead-smelter, is disposed of in part in the same manner, but in part it is driven off by volatilization. In whatever way it is gotten rid of, however, it leads to increased cost in smelting, wherefore it is customary to make a higher charge for smelting zinc-bearing ores according to the excess in zinc over a certain limit, which may be, for instance, 7 per cent.

The method of calculating furnace charges, which is the duty of the metallurgist or superintendent of the works, is too complicated to be explained here in detail, but its principle, which is simple, may be indicated. The smelter buys ores from many mines in lots varying from a few

hundred pounds to 100 tons or more, low grade ore being shipped usually in larger lots than high grade ore. On receipt at the smelting works the ore is sampled and assayed for gold, silver, and lead, and the settlement with the miner is made on these results. The sample is also analyzed to determine its contents in iron, alumina, manganese, zinc, sulphur, silica, and other elements; in the case of sulphide ores a sample is taken after roasting and analyzed in the same manner.

Analyses are made also of iron, flux, limestone and fuel. Having arrived at the composition of his material, the metallurgist calculates the proportion of each required to make the proper mixture for the furnace charge. There must be sufficient iron and lime to combine with the silica of the ore in making a slag of desired composition. The ore itself will contain some iron, and perhaps some lime. What more may be needed must be obtained by adding iron, flux and limestone. Iron must also be allowed for combination with the sulphur and arsenic in the ore. Lead is non-fusible, but plays an all-important part in the furnace as the collecting agent for the precious metals, for which purpose it must be present in certain proportion; hence the ores used in making the mixture must be selected so as to give the charge the proper amount of lead. The silver and gold contents of the ore must be considered also, in order to make bullion of an economical grade. The composition of the charge having been determined, the proper proportion of each kind of ore is wheeled to a great bin, where it is made up into a bed, amounting to a thousand tons or more, which is drawn upon for the furnaces as needed, the proportion of limestone and fuel being weighed out and mixed with the charge on feeding.

American Improvements and Inventions.

Discussion by T. A. Rickard of Denver, Colo., of Paper Read by James Douglas, New York, before the American Engineering Congress.

Mr. Douglas's paper will be of great value for future reference; but the ground which it covers is so extensive that it was impossible not to make some omissions and some small errors.

The description of the two types of stamp mills (those of Colorado and those of California) is open to criticism. The California "stamp-head and stem" are said to weigh from 700 to 800 pounds. This is not accurate; the total weight varies from 750 to 1000 pounds. The most usual weight at the present time is 850 pounds, and it is distributed as follows: Stem, 335 pounds; stamp-head, 225 pounds; shoe, 160 pounds.

The pulp is said to be discharged from "both sides." Does the author mean the back and the front of the mortar? Double-discharge mortars have long been abandoned in the gold-mining regions of California and Colorado, though they are still retained in silver mills.

The Colorado stamp weighs 500 to 600 pounds. Stamps weighing so little as 400 pounds are not now used. A 550-pound stamp would have its weight distributed as follows: Stem, 220 pounds; head, 185 pounds; tappet, 60 pounds; and shoe, 85 pounds.

The typical Colorado (Gilpin county) mill is not characterized by so rapid a drop as 40 per minute. The minimum is 26 to 28; the maximum, 30 to 32.

In the matter of concentrating machines of the vanner class, Mr. Douglas mentions those most commonly in use. He very properly does not express any preference for any one type, yet I feel that there is one fact to which attention may be called. The experience of the millmen of the chief gold-milling centers of California (Amador and Nevada counties) gives unanimous testimony to the effect that the Frue vanner requires less attention and gives less trouble than any of the other machines which have been constructed upon the principle of the endless rubber belt.

In the matter of concentration after amalgamation in an ordinary gold stamp mill, the American metallurgist has no great reason to feel proud. There has been a marked tendency to adopt a follow-my-leader policy. That two Frue vanners should treat the pulp discharged by five stamps is a rule slavishly followed, whether those stamps crush 8 or 15 tons per day, and whether the ore crushed contains 0.5 or 5 per cent of the material concentrated.

I would also draw attention to a mistake which others have doubtless remarked long ago. The passage of all the pulp direct to the vanner is surely wrong in principle. Some effort at sizing should precede concentration. Such sizing does not seem a costly or difficult operation. As it is now, the vanner is called upon to concentrate particles of pulp ranging from 30-mesh to impalpable slime.

The designing and building of a mill is left too much in the hands of the foundry and too little to the man who is to use it. Again, the manager usually gives more attention to the winning of the ore than to the subsequent extraction of the values in it. There is room for much improvement in these directions.

In referring to the system of hydraulicking used in the

California gravel mines, Mr. Douglas has omitted any reference to the "elevator." This machine is a truly American invention, and has added largely to the areas available for hydraulic mining.

The Caribou Mines

John Bowren, gold commissioner of the Caribou district in British Columbia, is a guest at the Lick, says the *Call*. Mr. Bowren went to British Columbia 32 years ago, making the trip overland from Winnipeg through the Canadian Northwest by ox team. For the past 20 years he has held the position of gold commissioner.

"The annual output from the Caribou district is about \$200,000," said Mr. Bowren. "Quite an influx of miners from California and Colorado is now taking place, and we look to see a great development. American miners are cordially welcome, as their experience makes them invaluable to the district. The way of reaching there from Vancouver is to take the Canadian Pacific to Ashcroft, where a weekly stage connects with the mines about 200 miles distant. When the British Pacific is constructed, which will run from Victoria, on Vancouver's Island, some distance to the north and cross to the mainland where the waters narrow, thence proceeding in an easterly direction, we shall have rail communication with the rest of the world.

"The gold is found in placers and mined largely by the hydraulic process. Miners, even with the old-fashioned rockers, make from \$2.50 a day upward. Much English and American capital is going into the district. Miners in the employ of companies are paid \$4 a day. There are about 2000 miners in the district, many of whom are old Californians who went to the Fraser river excitement in 1858.

"Formerly the method of mining was to sink shafts from 25 to 100 feet and then make drives along the bedrock. Now leases are being made on the streams, and the system of dredging employed in New Zealand is being introduced. The dredging is performed by suction, and can be made to pay, it is thought, at five cents in gold to the yard. The dredges can work in 25 feet of water, bringing up the gravel in much the same way that the ooze and mud is brought up in dredging for the improvement of harbors.

"J. S. Hawks has a lease of ten miles along the Smoky river. The lease runs for 20 years. He is now in this city arranging for dredging machinery.

"The mining laws of Canada are very liberal," continued Mr. Bowren. "A license costs \$5, the recording of a claim \$2.50, and the provincial revenue tax, imposed on all miners, is \$3 in a lifetime. These are all the imposts. Foreigners have the same privileges as British subjects."

Good Luck for Pocket Miners.

The pocket miners in the vicinity of Sonora are enjoying a season of prosperity. Pocket mining is one of the most exciting of all industries. In one pan a color cannot be seen, and the next may reveal to the gaze of the prospector bright, glittering gold, in one bunch sometimes reaching into the thousands, while again a prospect may be followed for months without success. Many large deposits have been passed, in trying to make too much ground, by the miner, and years after found by those who were lucky and experienced in the art. Prospectors have run within a few feet of a fortune and abandoned their claim for those more fortunate to extract what the former owners would have found had they not been disheartened.

The Tuolumne Independent reports that about four weeks ago Mike Terzich, while prospecting in an old abandoned shaft which was about ten feet in depth, on Bald Mountain near the famous Sell mine, found a good prospect. He sank about two feet when he took out a deposit of about \$60.

Not being able to work the claim alone to advantage, he took in two partners, Yonco Terzich and Wm. Punter. They at once started a tunnel about twenty feet below the shaft, to strike the pay shoot, and had worked about three weeks, when their labors were rewarded March 5th by finding a pocket of between two and three thousand dollars about two feet from where the first bunch was secured. This shaft was formerly worked by George Topping, and that young man is now wondering why he did not sink a few feet farther. Prospectors have been on the hill and located claims to the north and south, so that now not even a foot can be taken up.

J. D. Sellick and son, working a claim on Wolfing's hill, took out a pocket recently of about \$1,400.

Gene Elshree extracted \$1,500 from the Stewart claim, near Brown's Flat, a short time since.

Joe Joseph and Ed Sincok are reported to have taken ten pounds of gold from their mine near Brown's Flat in one day recently.

The Chenoweth brothers recently unearthed a pocket of nearly \$2,000.

Temperatures in Deep Mines.

M. Joseph Libert, Chief Engineer, Corps of Mines, Belgium, in a recent communication on Temperature and Nature of Waters in Deep Collieries, made to the Belgian Geological Society, gives some interesting data on the increase of temperature due to increased depths at the Produits colliery, Mons. The mouth of the shaft where the observations were taken was 246 feet above the level of the sea. The lowest workings in coal were at a depth of 2132 feet, and the total depth of the opening was 3773 feet.

The temperature of the rocks was measured by a specially constructed mercurial thermometer, enclosed in a shot hole with a clay plug, the thermometer being kept in this position for two hours. The thermometer was about a meter (3.281 feet) long. The reservoir was protected by a perforated iron plate, fitted to the hollow cylinder of wood in which the tube was enclosed, and the latter with the reservoir was inserted in the shot hole for a length of two feet. In the portion projecting beyond the hole, the cylinder was cut out so as to permit the reading of the mercurial column.

On February 6, 1889, at the foot of the shaft, at a depth of 3363 feet, the thermometer placed in a shot hole three feet long showed a temperature of 107½° Fahrenheit, while that of the air at the foot of the shaft was 82° Fahr.

More complete observations made later showed the following results:

October 16, 1889.	
Temperature on the surface.....	43° Fahr.
Temperature at a depth of 3117 feet.....	68 Fahr.
Temperature at a depth of 3773 feet.....	87 Fahr.
Temperature at a depth of 3773 feet.....	116½ Fahr.
December 21, 1889.	
Temperature on the surface.....	25° Fahr.
Temperature at a depth of 3117 feet.....	68 Fahr.
Temperature at a depth of 3773 feet.....	86 Fahr.
Temperature at a depth of 3773 feet.....	104 Fahr.
December 31, 1890.	
Temperature on the surface.....	17½° Fahr.
Temperature at a depth of 3117 feet.....	50 Fahr.
Temperature at a depth of 3773 feet.....	86 Fahr.
Temperature at a depth of 3773 feet.....	104 Fahr.

At a depth of 3773 feet an exploring drift was driven toward the north a distance of 235 yards. A borehole preceding the advance of the drift tapped a spring of water, the temperature of which was 118° Fahr. This water came from fissures in a bed of sandstone belonging to the north slope of the basin, and in a completely virgin region. It is reasonable to suppose that the temperature of this water is the same as that of the rocks occurring at that depth, and it agrees very well with that found on Oct. 16, 1889, in the shot hole at the bottom of the shaft. Subsequent experiments, however, proved an appreciable diminution of temperature, which must have been chiefly due to the cooling of the rocks in the neighborhood of the excavations by the ventilating current, which was necessarily very strong in order to make it possible for the men to remain there.

It may be admitted that, beyond the depth of 82 feet, variations of temperature in the atmosphere exert no influence, and that at this depth of 82 feet the temperature is equal to the annual mean of the air on the surface at the point under consideration. Thus, if we assume the mean annual temperature to be 50° Fahr. In the present instance, we deduce the mean geothermic degree of

$$\frac{3773-82}{118-50} = 54 \text{ ft.}$$

This result agrees almost exactly with the general mean obtained by Cornet in the various experiments which he made in the collieries of the Conchard de Mons. The rate of increase in depth for a degree Fahrenheit was 45 feet. In Cornet's experiments the depth was only 1670 feet, and they were made in unventilated headings at a considerable distance from the shaft, so that it may be presumed that there would not be so close an agreement in similar conditions of depth. Prof. J. Prestwich, whose paper on "Underground Temperatures" was published in the proceedings of the Royal Society of London, in 1886, found, from a comparison of the results of various experiments made in English and Belgian collieries, a mean rate of increase of 1° Fahr. for each 49.5 feet in depth.

In the opinion of M. Libert, the increase of temperature in rocks does not appear so simple as to be represented by an arithmetical progression, and therefore the experiments made at the Produits colliery do not furnish in themselves sufficiently exact data on which to base a rate of progression. However, if the results obtained at this colliery are combined with an observation made in the No. 1 shaft of the Grand Buisson colliery, in the same basin, and the mouth of which is 292.3 feet above the level of the sea, it is possible to obtain information with a certain degree of value. At the last-named shaft, at a depth of 2264 feet, a strong feeder of water with a temperature of 80½° Fahr. was struck. By comparing this temperature with that of the spring struck in the exploring drift in the Produits shaft

it will be found that the increase of temperature of 1° Fahr. takes place for every 41.2 feet of depth.

This divergence is so great that even the error of one or two degrees in the adjustment of either one of the two thermometers will not account for it. According as either one or the other of these figures is adopted, it may be deduced that between the surface and a depth of 2215 feet the increase of temperature will be 1° Fahr. for every 69.3 feet or 65.6 feet. In support of this view, M. Libert quotes the results obtained by M. Walferdin in the borehole at Le Creusot, as noted in the *Compte-Rendus* of the Paris Academy of Science. He found that the heat of the earth increases from the surface to a depth of 1800 feet at the rate of 1° Fahr. for every 56 feet, and that between 1800 feet and 2625 feet the increase is 1° Fahr. for every 43.4 feet.

Bauxite Mining in Alabama.

The growing importance of aluminum gives interest to the ore from which it is obtained. This ore derives its name bauxite, or banxite as it is more commonly called, from the town of Beaux, or Baux, near Arles, in southern France, where it has been found in large quantities.

An article by Henry McCalley, in *Science*, is our authority for the following statements concerning the present status of the mining of the ore in the South:

Of the four companies which have been engaged in the industry, only two are now operating. They are known as the Republic Mining and Manufacturing Company and the Southern Bauxite Mining and Manufacturing Company.

But three mines are being worked at present; they are all near Rock Ruo, Alabama. An average sample of the ore from one of these mines shows on analysis about this composition:

Alumina.....	61.00
Ferric oxide.....	2.25
Silica.....	2.10
Titanic acid.....	3.12
Water.....	31.58

Samples from the other mines differ a little from this; they yield from three to five per cent less of alumina. The mining is easy, as the ore is soft and can generally be taken out with a pick; it is, however, rather expensive, as the ore varies so much in quality that it must be carefully sorted by hand and with the screen.

The diggings are on side hills, and are drained by open ditches. The ore whose analysis has been given is about 35 feet thick in the mine. It is concretionary; the best of it is found in a middle seam four or five feet thick.

Owing to its hygroscopic property all the ore has to be dried before it is shipped.

This is done by spreading it out in the open air, for the action of the sun and wind.

When favorable tariff legislation makes it safe to increase the working capacity of these mines, artificial means of drying and better drainage facilities will be adopted.

At present only the best grade of ore is shipped. It is used for the manufacture of alum, which could as well be made from the inferior ore now lying in heaps about the mines, but to compete with the cheap imported ores, set over by men who had the entire business in their hands before these mines were open, only the best product can be put upon the market.

THERE were 96,996 shares represented at the Chollar Mining Company's meeting on March 21st out of a total of 112,000 shares, in which the mine is divided. The old Board was re-elected, as follows: A. K. P. Harmon (president), Thomas Cole, Thomas Anderson, E. P. Barrett and D. C. Bates. Charles E. Elliott was continued as secretary and H. M. Gorham as superintendent. The report of the latter showed 1588 tons ore reduced during the year, yielding \$25,174 gross, on which was realized \$16,602 in gold coin, the difference representing the discount on silver. The secretary reported an overdraft of \$11,983. To meet this deficit, and to provide funds for future operations, the directors immediately levied an assessment of 20 cents per share. This will realize \$22,400. The previous assessment of 10 cents per share became delinquent in January.

THE United States Minister at Santiago has informed the Department of State that the Government of Chile will sell at public auction at that city June 15th eight of the most valuable and extensive of the nitrate concessions and a large area of nitrate deposits that have never been touched. Bonds and securities amounting to 40 per cent of the valuation of the property must be deposited by the bidders and 20 per cent of the purchase money must be paid into the treasury, with ten deferred payments to be secured by mortgage. Colonel North, the nitrate king, now has most of the concessions that are to be sold, but instead of renewing them directly the Government expects to get better terms by open competition at auction. The English Government opposes the sale.

Nickel Mining in New Caledonia.

Nickel mining in New Caledonia was the subject of a paper read recently at the London Institution of Mining Engineers. Mr. Garland traced the discovery of nickel ore in New Caledonia to M. Jules Garnier, who, when engaged in a geological survey of the island in 1864, met with a strange green mineral, which was destined some years later to become one of the most important sources of nickel in the world. At first there was a good deal of misconception as to the true nature of the mineral, and for a time its green color gave rise to the belief that it was an ore of copper; and, indeed, a shipment was, it is said, made to a smelting works in Sydney to determine its value for copper. It is needless to say that the attempt to extract copper from the ore proved futile. It is not, however, the first time that an ore of nickel has been mistaken for copper ore, for it is well known that *Kupfernickel* was so called by the German miners because they frequently mistook it for an ore of copper. It is recorded that when the French colonists realized the importance of the discovery, the government offices were daily besieged by applicants for concessions, and that the excitement became intense. The deposits at Mont d'Or were found to be unremunerative, but it was not long before fresh discoveries were made in other parts of the southern half of the country along the east coast, and mining for nickel soon became an established industry. For the first few years the mines were worked solely by private enterprise, but in 1881 fresh impetus was given to the new industry by the starting of a big French company, "La Societe le Nickel," locally known as the "Nickel Co.," which, though not the only nickel mining company in the island, is far and away the most important. It has acquired mining rights over an immense area; it works a large number of mines under the direction of its own officers, and leases a large number of others; it is the purchaser of all the nickel ore raised in the island; it has a monopoly of the shipment of the ore to Europe, and it has, moreover, enormous influence in the country. Mr. Garland found, during his recent visit, that the eagerness to acquire nickel concessions, though not so keen as it is reported to have been formerly, has by no means died out, and that new grants are constantly being demanded from, and granted by, the Mining Department at Noumea. The production has now reached over 60,000 tons of nickel ore per annum, is still increasing, and it would appear that nickel mining in this far-off French colony (and penal settlement) was still in its infancy. From official statistics published at Noumea, and brought down to July 1, 1892, he gathered that the total number of mines at that date was 324 (of which about 80 were in active operation), comprising an area of 48,956 hectares, or, say, 120,921 acres.

The paper, after dealing with the geological and mineralogical aspects of the question, went on to say that the mode of working is either by tunnel mining or by open quarrying. The first-named method is adopted when the veins happen to be fairly persistent and of good width; the latter method when they are small—say less than 6 ins. to 12 ins.—and when stockworks occur. It sometimes happens that both systems come into operation in different parts of the same deposit. For example, the larger veins are exploited by tunnels and subsequently the cap or top of the peak is quarried for the sake of the numerous small veins. When underground mining is resorted to, the system followed is that universally practiced in metal mining, and familiar to all mining men. A series of tunnels or adit levels, one below another, is extended into the mountain along the vein, and connected in the usual way by winzes and rises for ventilation, and for convenience of stopping. Mention was made of another nickel mine visited by the author, where the bulk of the ore was raised by open quarrying, but where there was also some underground mining of a somewhat irregular kind. The veins, some of them several inches in thickness, were not persistent in any one direction, and thus it happened that after driving on a vein a few yards it might be cut off by a productive cross vein; the latter would then be followed right and left till another interruption occurred or the vein became poor. A winze would then be sunk or a rise put up to prove the vein, and, perhaps, fresh levels driven in different directions from the bottom of the one or the top of the other; and thus the mine, to a visitor, seems to be a perfect labyrinth. Quarrying is done in terraces from the top downward, each terrace having a wide floor on which the rock is blasted down, and where the ore is prepared for market. The preparation of the ore for the market is of the simplest description. The crude ore having been reduced by spalling to suitable size, a portion, consisting of mixed ore and rock, is separated by cobbing, the cobbled ore being always of high grade. The remaining portion, consisting of the fine ore a good deal mixed with stone, is all carefully collected and screened in hand

sieves of $\frac{1}{2}$ -in. or $\frac{3}{4}$ -in. holes. The fine ore which passes through is not further treated; the coarse ore which remains in the sieve is hand-picked, the useless stone being removed. The picked ore is now thrown with the fines and the cobblings, and the whole mixed together forms the marketable product. As might be expected, the ore prepared in this crude way, by screening and hand separation without the aid of water, contains a large proportion of stone and dirt; but this is the system universally adopted throughout the nickel-mining district, the difference in the specific gravity between the nickel ore and the country rock not being sufficient to make easy and economical separation by water practicable.

The scarcity of labor is one of the chief difficulties in connection with mining in New Caledonia, and Kanakas are imported from the neighboring islands, and even Chinese and Japanese are sometimes imported in considerable numbers. It is a novel and interesting experience to see a big mine or a series of quarries in full work, manned entirely by convicts, guarded by a number of warders all armed with revolvers. Some of the men are drilling holes, others blasting with dynamite, some spalling, cobbing, screening, or hand picking, while others are tramming or wheeling away the waste rock. Some also are placing the ore in bags ready for transport down the mountain side, on cable ladders or tramways, to the wharf for shipment. All is activity, but there is an absence of zest and cheerfulness in the performance of the task, for, naturally enough, the convict is not notorious for the energy and enthusiasm he throws into his work. At a group of four mines at Thio, owned by the Nickel Co., which the writer was courteously allowed to visit, 900 men were employed, 750 of whom were convicts, and 150 *libere*. The latter are not employed at the same mines as the former.

Mr. Garland closed his paper by mentioning that the nickel deposits of New Caledonia are said to extend only to a limited depth, one formerly important mine having, it is reported, ceased to yield nickel at a depth of 300 ft., the ore at that depth passing into the white silicate of magnesia. He has no evidence which would justify him in venturing a decided opinion on this point, but the enormous area which the nickeliferous serpentines cover seem to indicate that it will be a very long period before the nickel deposits of New Caledonia will become exhausted.

Petroleum Industry of Galicia.

Although the petroleum wells of the United States and of Russia do not seem by any means to be exhausted, it is of the highest importance to discover what other countries are prepared in their turn to supply mineral oil, says the *American Manufacturer*. As can easily be understood, this liquid combustible is constantly being adapted to more and more numerous, and to more and more varied employments. It is no longer restricted to lighting purposes. Special motor engines consume enormous quantities of it day after day. It would, therefore, be as well to devote some attention to the petroleum basin of Austria, the more so as it has hitherto almost entirely escaped notice.

Of all the provinces of Austria, Galicia is the one which is best provided with subterranean wealth. The mineral riches of this part of the Empire are very varied and exceedingly abundant; they include iron, zinc, lead, and even auriferous sand. Salt beds, the product of which is enormous, form an immense semi-circle through the whole length of the country; they begin near Cracow, with the celebrated mines of Wieliczka, and they extend to the Bukovine river.

But, as is often the case, it is precisely in the neighborhood of these salt beds that petroleum is found. If we glance at the map of Austria, we see that the Carpathians, between upper Silesia and Wallachia, describe a vast curve, the concavity of which is toward the northeast. This chain of mountains forms the frontier of Galicia, and it is upon its concave side that the petroleum rocks are found in a zone parallel to that of the salt works. The petroleum basin is formed of a multitude of little beds, most of them about 3 km. in breadth and 300 in length.

The existence of petroleum in this country has long been recognized, but no means have been taken to determine its exact nature. In old days the Galician peasants were accustomed to extract from the local soil a bituminous substance, which they used to oil their carts. There is, indeed, a tradition that it was at Cracow that the first petroleum lamp was ever used. According to M. Steinman, it was about 1830 that the Galicians began to work a substance called *ropa*, which is simply the raw oil, out of which they manufactured asphalt and a lamp oil. A chemist of Lemberg was the first to carry out this trade on any scale. This was the time when the "oil fever" was breaking out in America; the rumor of fortunes so rapidly made in the United States found its way to Galicia, and it was felt then that such a source of wealth ought no longer to be neglected.

Mechanical Arrangements in Underground Operations.

Mr. R. H. Wynne, in a paper on this subject read before the North Staffordshire Mining Institute, ably compared the relative value and efficiency of the various mechanical arrangements used in mines. In commenting on mine haulage he called attention to the fact that, inasmuch as large outputs and consequently large working areas were essential in the profitable working of collieries, the necessity arose for the most approved system of underground haulage, the cost of which is one of the most important items in the production of the coal. He stated that the using of horses or mules for the underground conveyance of coal except for short distances during the opening out of a colliery, and bringing the wagons from the face to the hauling stations, must be replaced by some more economical means of locomotion. Having discussed the advantages and the disadvantages of the use of steam underground, he referred to compressed air. He said unquestionably compressed air was a convenient form in which to transmit power from the surface for use underground for a variety of purposes—for example, hauling, pumping, heading by machine, drilling holes for blasting, and to drive coal-cutting machines; and with its convenience might be combined safety in using, freedom from damage to roads by heat or leakage, referred to in relation to steam. He referred to its use in different mines, and gave opinions of various writers as to its value. As compared with steam he thought compressed air was much better adapted for transmitting power considerable distances underground, but this had its limits, looking at the increase in the size of pipes to carry the air extremely long distances, and the extra power necessary to be applied to the compressor to attain the required pressure. Moreover, the exhaust from the motors had the effect of cooling the air current, and adding a little to its volume; whereas steam had the opposite effect on the temperature, and required special means to be adopted for its disposal.

Electricity as a medium for the transmission of power had not by any means attained its fullest development, but during the past four or five years its use for colliery purposes had received an immense impetus, and there was no doubt it would become in a short time the medium *par excellence* for the transmission of power over long distances underground for a variety of purposes—for example, hauling at far-away stations where the main haulage worked from the surface or engine at the bottom of the shaft was not conveniently applicable; pumping water from the bottom of inclines under similar circumstances; and actuating drilling and coal-cutting machines. It also afforded the means of obtaining superior lighting on the surface and in the main roads underground, and most likely in the near future a portable and safe light for the working collier.

The advantages of an electric system for districts not easily accessible to direct steam power or compressed air motor might be summarized thus: "A reduction of capital expenditure when compared with other systems. Facility in putting conducting cables down shafts and laying them underground to distant motors. Small loss from resistance in cable or leakage of current to the earth when compared with waste in a compressed air system. Lowness of cost of maintenance. Speed with which an electric plant can be erected and set to work." Sparking at the motor, from which some danger might be apprehended in a fiery mine, was said to have been overcome by the adoption of the enclosed motor. The breakage of a cable and the sparking therefrom was a contingency to be considered. Although the advantages of electricity were considerable, it was doubtful whether it would be good policy to adopt such a system where steam could be used direct from the surface for haulage purposes; but there did not appear to be the least doubt of the value of electric motors in situations not suitable for other mechanical power.

Speaking upon other points relating to underground haulage, Mr. Wynne proceeded to say there were the endless rope, the main and tail rope, and the simple tail rope. The endless rope, with the slow movement and steady flow of traffic, appeared to be in greater favor than other systems. It was probable that in his district, with its great variety of inclination of the seams, nature of the roof and floor, and other circumstances, difficulties were present which did not occur to those engaged in more favored districts, calling for greater caution and consideration before being committed to a large outlay on any particular system. It was a question for consideration whether in the case of a seam dipping at a considerable angle, and supposing that an endless rope would be advantageous on the local ways, it would be judicious and economical to construct the dip roads at such an angle to the full dip of the seam as to render the endless rope system available throughout.

Scientific Progress.

Prof. Davidson in the East.

Prof. George Davidson, of the United States Coast and Geodetic Survey, returned home recently after an absence from this city of nearly three months, and his observations are thus noted in the *Examiner*: Prof. Davidson started for Washington the 1st of January to attend a geodetic conference called together by Prof. T. C. Mendenhall, superintendent of the Coast Survey. With him went Captain E. F. Dickins and Fremont Morse of the same service. Capt. Dickins still remains in the East, but Mr. Morse returned a few weeks ago, and will shortly take up field work, probably in Alaska.

The geodetic conference was the first meeting of the kind attended by the representative field men of the Coast Survey in many years. Only a few scientists were invited to the congress outside of the astronomical and geodetic observers of the survey. The meetings commenced on January 10th, with Prof. Davidson as president and O. H. Tittman as secretary. On 42 days papers were read and discussed, embracing every variety of geodetic work, astronomical determinations, magnetic and gravity observations, and tidal investigation. In addition to his duties as presiding officer, Prof. Davidson read a paper on a new method of determining irregularity of the micrometer screw. This treatise attracted a good deal of attention, since irregularity in the pitch of the screw is one of the most influential sources of error in micrometer work, and one of the most difficult to ascertain by the ordinary methods.

During the latitude variation work on Clay street hill, the professor and his son, Thomas Drummond Davidson, conducted a long series of experiments, with a view to solving this problem, and succeeded in determining the source of error with an accuracy far exceeding the necessities of observation. By request of the Philosophical Society of Washington Prof. Davidson repeated his lecture before that body, and his paper is now being published.

While in the national capital Prof. Davidson visited the new naval observatory, where is housed the great 26-inch equatorial with which Prof. Asaph Hall discovered the two satellites of Mars. He states that the observers were hard at work on every clear night and making the best possible use of their atrocious climate. The geodetic conference had recommended that the star list published by the "Nautical Almanac," under Prof. Simon Newcomb's direction, should be largely increased for the benefit of the fieldmen of the Coast Survey. Prof. Davidson saw the celebrated American mathematician about this matter, and Newcomb cordially indorsed the proposition, and will endeavor to have the star lists improved. Since only those stars, the apparent positions of which are given, can be used from day to day by the field observers, an increase in this list will greatly facilitate the latitude work of the Alaska and other boundary survey parties.

Prof. Davidson had a long conference with Prof. Newcomb also on the latitude question. Prof. Newcomb has from the start been deeply interested in the series of experiments made to determine the latitude variation, and he states that the 4000 separate determinations made by Prof. Davidson in San Francisco are of such accuracy that they may be used not only for the primary investigation, but also to determine a new value for the constant of aberration. This is one of the fundamental constants of observational astronomy, first determined by Bradley in the last century, and steadily improved as the observational methods have been refined since that date.

After a partial recovery from his Washington illness, Prof. Davidson started west-

ward, stopping at New York, Allegheny and Chicago on his way. At Allegheny he made quite a visit with Prof. J. E. Keeler, formerly astronomer at the Lick and now director of Langley's old observatory. He says that Prof. Keeler is doing faithful and conscientious work at his place, especially in the line of astro-physics, studies of stellar spectra, etc. The professor also visited John A. Brashear, the celebrated maker of lenses at Allegheny, who constructed the giant spectroscope for the Lick Observatory. The most interesting thing he learned here was the forthcoming erection of a 30-inch telescope just a couple of miles to windward of the smoky city, where some good work may be done, particularly since the site selected has an altitude of over 400 feet above the river. Brashear has already started upon the lenses, the money for which has already been subscribed by the citizens. When this great telescope (the third largest in the world) is completed, Prof. Keeler will have an instrument to work with worthy of his astronomical skill.

At Chicago Prof. Davidson visited S. W. Burnham, of course. The ex-Lick astronomer, who has just received the gold medal of the Royal Astronomical Society for his double-star work, was deep in the preparation of his great double-star catalogue, for which a congenial court position gives him occasional opportunity. Together Professors Davidson and Burnham visited the Northwestern University at Evanston, Ill., where Crew and Hough are pursuing their astronomical studies. Dr. Henry Crew will be remembered as another Mt. Hamilton astronomer, who found the conditions there unpleasant and accepted the first good offer he received.

Prof. Davidson was greatly interested in Crew's magnificent photographic work on the spectra of stars, several specimens of which he has brought back with him. Prof. Hough showed the California astronomer a new device for controlling the movement of his large equatorial. The new control operates every second and keeps the telescope in absolutely uniform motion, so that the best photographic work is rendered possible.

When Prof. Davidson was asked about the reported attempt to abolish the Coast Survey, his conversation became animated, even for Prof. Davidson. He said that the same scheme, or similar ones, were brought up with each successive Congress, and that he did not believe they could succeed. The leading men in Washington scientific circles heartily approve of the work of the Survey, and understand its importance, and the leaders in the House are in sympathy with the needs of the service.

Origin of Anthracite.

The main difference between anthracite and bituminous coal is that the former is devoid of volatile matter, says an exchange. Heretofore the theory generally accepted to account for this difference was that presented by Prof. Rogers while conducting the first geological survey of Pennsylvania. Observing that the anthracite beds lay in the eastern part of the State, in close proximity to the Archean axis of elevation, he surmised that these coal beds had, so to speak, been "coked" upon the elevation of the Appalachian chain; that is, he supposed that the heat and pressure accompanying the Appalachian elevation, acting most vigorously near the axis, had distilled and removed the volatile matter of coal beds nearest it.

To adjust the theory to increasing facts, Prof. Lesley added the supposition that the heat involved in this theory was brought up by conduction when the superincumbent layers of rock were extremely thick, which have since been mainly removed by the erosive agencies which have been active over the region for millions of years.

The inadequacy of these theories has led Prof. J. J. Stevenson of the University of

New York to propound another and simpler theory, which was ably defended by him at the recent meeting of the Geological Society of America.

He would account for the lack of volatile matter in anthracite coal by the simple fact that it had been longer exposed to that kind of decay which takes place in vegetable matter when immersed in water, and which consists chiefly in the loss of hydrocarbons which constitute the volatile elements in bituminous coal. On this supposition, the anthracite beds are those which were formed earliest in the swamps and lagoons of the carboniferous period, and remained longest devoid of the coverlog of the sedimentary deposits which subsequently preserved them from further change.

This theory is confirmed by the fact that there is no such strict relation of the anthracite beds to the Appalachian axis elevation as Prof. Stevenson is about to publish. This simple cause seems adequate to account for all the phenomena, and probably solves one of the long-standing mysteries of geological science.

Sub-Aqueous Combustion of Fuel Gas.

A mode of generating steam by fuel gas without the use of heating surfaces has been invented by Percival Pickney of Portsmouth, England. His method which is quite novel and likely as impracticable, is described as follows: In the interior of the bare shell of a steam boiler (or in the inside of a suitable casting attached thereto) there is fixed that which has been named "a chamber seating." Upon this tried-up seating rests a conical chamber having an arrangement around its base which causes the two surfaces to form, when in contact, a tight joint, similar to that of a bell glass when used for experimental purposes with an air pump—the cone or combustion chamber being entirely and deeply submerged by reason of its position at or near the bottom of the boiler. There are vertical guides projecting upward from the chamber seating, up which the combustion chamber will travel during its recoil at each explosion. The mode of operating the invention is as follows: A charge of gas fuel having been injected into the inside of the cone it is immediately fired. As the result of the explosion the combustion chamber rebounds upward from the chamber seating, and so allows the heated and expanded products of the combustion to escape direct into the lowest stratum of the water of the boiler in the form of millions of little upward percolations. The combustion chamber having settled down (the guides) and formed a tight joint upon its seatlog, a valve opens, and so economizes even the small amount of residual pressure remaining in the chamber, which is caused to escape into a cylinder connected with the engine, from whence, after performing its duty, it exhausts.

The inventor claims that gas bubbles will ignite during their passage through water; hence, he holds that their sub-aqueous combustion is the solution of the fuel-waste problem. He declares that the loss of mechanical efficiency occasioned by the absorption of energy by the cold water jacket of the cylinder, and the extremely high percentage of energy which, as heat, is absolutely wasted in the exhaust, makes the gas engine greatly inferior to the use of steam generated on his plan. He states that in his motor the same combustion is caused to take place in a sub-aqueous or under-water chamber, from whence the products of combustion escape, not out into the open air, as in the gas engine, but into and at the bottom of the body of the water that is contained in the boiler. Consequently every unit of the heat evolved by the combustion of the gas is absorbed by the water, and thus, for every unit of heat energy evolved by the combustion, there is conserved or stored up its full equivalent of energy in the form of steam. He further claims that ad-

ditional to an enormous volume of steam from a given quantity of fuel he likewise secures and utilizes through the cylinders of the engine the heated and thus expanded air resultant from combustion.

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Table of Contents.

The following brief abstract of the contents will give an idea of the branches of the subject treated:

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Mechanical Progress.

Testing Cross-Compound Engines.

Some tests made upon cross-compound engines, by George H. Barrus, one of the judges in the department of steam engineering at the World's Fair, are followed by interesting results. The engine treated was of 14 and 28x24 inches, with unjacketed cylinders. The shaft governor operated upon the cutoff on the high-pressure cylinder only. The low-pressure cylinder cutoff is fixed, but may be adjusted by hand to any desired point. The exhaust of the low-pressure cylinder was passed through a Wheeler surface condenser and a Conover independent air pump was used. The engine was employed in driving a line shaft, to which was belted numerous dynamo machines generating current for electric lighting. The tests were five in number. The first three were made with three different loads, and the cutoff of the low-pressure cylinder fixed at a constant point, which was approximately at one-third stroke. The fourth test was made with an earlier cutoff in the low-pressure cylinder, and consequently a higher receiver pressure, the load being approximately a mean between that of the first and second tests. The fifth test was made with the engine running non-condensing. Steam, however, was still carried through the surface condenser, so that the quantity consumed could be measured by means of the weighing apparatus.

At the close of the trial the valves and pistons were tested for leakage, and the engine was found in rather an unsatisfactory condition in this respect; in fact, Mr. Barrus estimates that the steam consumption was increased not less than one pound per horse power per hour by this defect. A notable feature of the test was the fact that the engine rated at 300-horse power and with a load of 123.39 indicated horse power, or 41 per cent of the nominal capacity, used only 7 per cent more steam per horse power than it did when working at its rated power. The plea is sometimes made that a compound engine is not well adapted to situations where the load is variable, owing to its wasteful use of steam when working at small powers. The results obtained in this case indicate that the compound type of engine shows less fluctuation of economy than might be expected from a wide change of load. Indeed, the difference exhibited is remarkable for its small amount, and this good showing must be gratifying to those who advocate the unrestricted use of compound engines.

A New Quick-Firing Gun.

The new Salvator mitrailleuse, or quick-firing machine gun, having been adopted by the Austrian military authorities, a number of pieces have been manufactured and are reported to be ready for distribution, says the *Scientific American*. The gun is not intended for use in the field, as in the case of the English Maxim and Nordenfeli machine guns, but will be mounted stationary on the outworks encircling important fortresses. It is said to be only half the weight of the Maxim, and its average rate of discharge is about the same—300 rounds per minute, with a maximum of 320. The diameter of the bore is eight millimeters, being similar to that of the Mannlicher repeating rifle now in use in the Austrian service. The barrel is not incased in a water-jacket, and 1200 continuous rounds can be fired before it shows the effects of the excessive heat. The cartridges are supplied, as in the Nordenfeli, from a large hopper fixed above the firing chamber. The gun is fired by means of an ordinary trigger, with trigger grip, and a recoil spring supplies the automatic action. But the principal point of interest in respect of which the new gun differs entirely from the mechanism of similar weapons now in use in

other countries is the oscillating pendulum regulating the speed of fire. There are two firing commands with the Maxim—single fire and continuous fire. The discharge is regulated by the turning of the crank handle. The single fire is as the fire from an ordinary repeating rifle, while continuous fire represents the most rapid discharge of which the machine is capable. With the Salvator mitrailleuse, however, the great advantage is gained of sustaining a moderately heavy discharge of 30, 50 to 100 rounds per minute, and increasing it by means of a faster oscillation of the pendulum to 300 when a dangerous phase of attack has been developed.

Tensile Test of Wrought Iron Axles.

As previously named, a reduction appears to have been made on the original limit of tensile strength required by the new regulations of the railway companies for steel axles, viz., from 40 tons per square inch to 35 tons per square inch; but no modification has yet been made in the case of wrought-iron axles, says Thomas Andrews in the *Engineer*. The author therefore suggests, in the interest of safety—in order to prevent subsequent brittleness arising in the case of wrought-iron axles—a modification in the tensile strength of the iron axle from 22 tons to 20 tons per square inch. For all practical purposes the efficiency of railway axles is more than amply assured by the excessively severe drop test, which, in the author's opinion, is in excess of all reasonable requirements for either iron or steel axles.

The author, however, ventures to suggest, for reasons previously given, that the test for wrought-iron railway axles should be as follows: The axles to be capable of standing the following test without fracture, viz., five blows from a weight of 2000 pounds falling from a height of 20 feet upon the axle, which shall be placed upon bearings 3 feet 6 inches apart, and turned after each blow. After the fifth blow the axle to be broken. Also, each axle to be guaranteed to stand a tensile strain of not less than 20 tons per square inch, with say 25 per cent (or not less than 20 per cent as a minimum) of elongation; the test length to be three inches.

It will thus be seen from the above suggestion that the tests are proposed to be about equal for both iron and steel axles, i. e., as regards the tests of impact and elongation. With regard to the breaking strain per square inch for wrought-iron axles, it is only proposed for reasons stated in this paper—to be brought more in consonance with the nature of the metal obtaining in wrought-iron axle forgings, as ascertained from the results of actual past experience.

Stamped Steel Chains.

Attempts have been made from time to time to utilize steel for chain making, and in one of the later inventions in this direction a chain is produced out of bar steel each link being formed solid and linked in with its neighbors, says the *Age of Steel*. In the manufacture the steel has to be heated, and although an excellent chain is produced, the links are what are called open links—that is, they have no stay or cross-piece as in links of the cable pattern. Stays are added afterwards, but they do not form an integral part of the link. A subsequent inventor, M. Rongier, has, however, succeeded in forming a stay or stud with the link itself, the chain being stamped out of the solid bar, and this appears to give the finishing touch to the manufacture of weldless steel stamped chains. The method of production is very ingenious, and has been in operation at the works of the Patent Weldless Chain Company at Aston, Birmingham, England. The chain is made from a steel bar of cruciform section, and of the greatest length obtainable. This bar is put through a series of machines, in each of which pieces are punched out, so that after five operations

the links are perfectly formed, but are still connected together at the point where the inner side of the bow of one link crosses that of the other. In fact the bar represents a rigid chain, but on being passed through another machine it comes out a roughly formed but perfect chain with separate links. The chain then undergoes three more operations in which it is rectified, rounded, and finished ready for use. The process is a cold one, so that there is no deterioration of the metal by heating, the only heat applied being near the end of manufacture, when the chain is annealed in an oven for a short time. Owing to the limited length of the bars the chain has to be made in sections, and eventually coupled by special links, which are made stronger than the chain itself. These chains, which are suitable for general use, are produced in various sizes, from ½ inch down to 3-32 inch.

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Electricity.

Electric Lighting in Europe.

In W. McDewitt's report as expert to the Philadelphia Fire Underwriters' Association and Philadelphia Fire Patrol, regarding electric lighting in Europe, we find the following interesting information regarding European methods:

A very striking feature is the absence of poles in the streets of the cities visited. The lead set by the Government in placing telegraph wires under ground has been followed, and this has been the more easily done as the demand was small. Telegraph cables are drawn into iron pipe conduits with conveniently located draw-boxes. With low-tension currents considerable trouble arose from the use of insulated wires. Bare wires are now being experimented with, set in terra cotta or wooden conduits, and strung in the latter on porcelain insulators. The most severe high-tension work, that with the alternating current from Deptford, at 5000 volts, with 10,000 in case of a breakdown, is done with the Ferranti concentric mains, consisting of two copper conductors, the inner one insulated from the outer containing one by a heavy paper insulation. These are carried in the railway viaducts to a sub-station, and then with reduced current under the streets to distributing points. For ordinary 1000-volt alternating work good rubber-covered wire is used, drawn into conduits of different materials, but chiefly of wood.

Most of the conduits are under the sidewalk. The streets are too well constructed to allow of the continual opening we have in America, and it has been found cheaper and easier to confine the openings to the sidewalks.

Distribution by alternating current is usually done from underground distributing centers, current being taken from one large converter to the different buildings—a simpler plan than the separate building, separate converter plan.

No high-tension arc-light currents are used in buildings; they are confined to street lighting. This is due partly to the Board of Trade regulations and partly to the status of electricity as more of a luxury, while here it is a necessity and has not to compete with such cheap and excellent gas as that burned in Europe. Arc lighting in buildings is effected with low-tension arc lamps on incandescent circuits, the lamps being very handsome and closed in at both top and bottom.

Stranded wire, for all sizes above No. 18, Birmingham gauge, is used, although more expensive than solid wire and the insulation less liable to crack when the wire is sharply curved.

There appear to be no uniform rules for installation, each insurance company making its own inspections. The station buildings are all substantial with timber hard and solid, partition walls, stone stairs, substantial plastering, and they are generally very solid, showing that the fire risk and durability were both carefully considered. All wires are insulated with the best quality of rubber, but less care is taken with the wiring, staples being largely used.

Interviews with insurance companies and contractors prove that they have experienced as much trouble in Europe as we have here from defects in installation. They are learning fast, however, and profiting from our experience.

Electroplating a Ship's Bottom.

Every one familiar with nautical affairs knows that various marine growths, animal and vegetable, attach themselves to a ship's bottom; and that most vessels, therefore, need to be banded out periodically to be cleaned, says an exchange. To wood, steel and painted surfaces these parasites adhere

so firmly that mechanical means are required to remove them; but from copper they are washed off by motion through the water. Hence, the expense of frequent cleaning, and the great impairment of speed resulting from these growths, are averted by sheathing a vessel with this metal.

It is a cumbersome process, however, to apply the copper to steel hulls like those of the new navy. First, the vessel must be covered with wooden planking, two inches thick, bolted to the plates; and then the copper has to be riveted on to the wood. The two metals cannot be brought into direct contact so long as complete union is not effected, because destructive galvanic action would be thus induced. Thomas S. Crane, in view of these facts, has invented and patented the idea of coating steel vessels with copper by electroplating; and he has found a way to utilize this process without submerging the whole ship in the chemical bath, as is done with small articles that are plated with nickel or silver. He fits a box up with an elastic frame against the side of the vessel (which must be in a drydock) in such a way as to have a water-tight joint, and so that he can electroplate a section about 4x10 feet square; and when this is covered to a proper thickness, as it is in about 70 hours, he moves along a little, like a house painter, and coats another section. It is practicable, of course, to have a number of these boxes or tanks in service at one time. Where the sections overlap, the coating is continuous, like paint, and the copper adheres to the steel as firmly as if they were welded together.

Upon a vessel 400 feet long and drawing 20 feet of water the work can be done in eight or nine days, by using 60 baths on a side and having 780-horse power behind the dynamos. It has been estimated that the surface of such a vessel would amount to nearly 24,000 square feet; that 55,500 pounds of copper (at 12 cents a pound) would be required, and that the metal alone would involve an expense of about \$6660. Eighty tons of coal probably would be enough; and at \$4 a ton this would raise the bill to nearly \$7000. And then something would have to be added for the plant.

Underground Electric Conduits.

Of the large number of underground electric wire conduits which have been used or proposed, there are at present in successful use in America, on a large scale, four typical forms: Iron pipe, which may be either cast or wrought; cement-lined sheet-iron pipes; terra cotta or clay pipes, and wood tubes.

The most generally used are the earthenware conduits, and the most used of them are made of glazed terra cotta in sections three feet long, with one or more rectangular ducts, each capable of carrying at least three cables. Prof. D. C. Jackson, in *Cassier's Magazine*, says that in Milwaukee an ordinary cement sewer pipe has been made in the same manner as the tile, with cemented joints, and it makes a very fair conduit, which is a little cheaper than the special forms. The pipes are softer than vitrified tile, and, therefore, more liable to mechanical injury, but the system has not yet been long enough in use to fully decide on its comparative merits.

The simplest of all conduits, and one which is used quite generally, is a common wrought-iron gas or steam pipe, either laid bare in the ground or in a bed of concrete. Ducts are usually of two-inch or three-inch pipes, and since a three-inch pipe will carry four ordinary electric-light cables, the system is economical of space in the streets. One cable can be pulled out when the others are in the ducts, but the practice of handling cables separately when several are in one duct is not advocated by the most experienced. Joints in the pipe are made with a sleeve screwed on with a vanishing

thread, which is cut so that the ends of the pipe come close together inside the sleeve. The sections of pipe are generally 20 feet long. The great advantage iron pipe has over all other forms of conduit is its flexibility. It may be bent in any direction at any point, to avoid obstacles in the streets, and it should always be used when obstacles are particularly numerous. Some authorities claim that a conduit should never bend, but experience in New York and Chicago proves that cables can be pulled easily around several bends with radii of three feet or less.

Tubes of wood, treated with various substances to preserve them, have been manufactured by several companies and quite generally used. At present Philadelphia probably has in use a greater length of wooden conduit than any other city, though there is considerable of it in Chicago and Brooklyn. The commonest form of wood conduit is made up of four-inch by four-inch pieces of wood, with a three-inch hole bored through from end to end. They are joined either by a male and female union or by simply butting the ends together.

A cement-lined iron-pipe conduit consists of a tough sheet-iron shell, riveted and lined with five-eighths of an inch of pure cement, no sand being used, and the inside being carefully smoothed. The pipes are made in eight-foot lengths and of various diameters.

All of these conduit systems are in successful operation on a large scale, but the period of use has not yet been long enough to prove positively that they will all endure satisfactorily. The users of each appear to be well satisfied.

Useful Information.

A Word to the Sleepless.

Dr. J. E. Huxley of Maidstone, England, thinks he has hit upon the natural remedy for sleeplessness. It is, in brief, to curl under the clothes like a kitten, or put the head under the wing like a hen. He says: "This insomnia seems to be now a universal affliction. We live wrongly, sit up late, and overwork the brain, and then go to bed in an excited condition. No one seems to have hit upon the natural remedy. I think I have. People take chloral and the like at their peril, and the fatal consequence not seldom ensues. It is all wrong, for you cannot control the dose required for the exact circumstances. But try nature's plan instead: lower the supply of oxygen to the blood, produce a little asphyxia, limit the quantity of air to the lungs, and heart and circulation becoming quicker, the brain loses its stimulant and sleep follows. When you find yourself in for a sleepless night, cover your head with the bedclothes and breathe and rebreathe only the respired air. Thus you may reduce the stimulating oxygen and fall asleep. There is no danger. When asleep you are sure to disturb the coverings and get as much fresh air as you require, or, when once drowsiness has been produced, it is easy to go on sleeping, though the air be fresh. What do the cat and dog when they prepare to sleep? They turn around generally three times, and lastly bury their noses in some hollow in their hair, and 'off' they go. They are in no danger, although it might look as if they were from the closeness with which they embed their noses." From the Medical Press and Circular.

Estimating the Sulphur in Coals.

A method whereby the sulphur in coals may be estimated and their suitability for gas making determined before purchase, has been introduced by Herr W. Hempel, an authority on coal gas in Germany. The coal to be tested is powdered and pressed into a little platinum wire cylinder, to which a long platinum wire is attached, and then

burned. The combustion is effected in an ordinary glass bottle, which is fitted with a treble perforated india-rubber stopper. Through this passes a tube with a glass stopcock, and which widens out into a cylinder; also two glass tubes, to the lower ends of which two thick platinum wires are fused. One of these wires carries the platinum cylinder or basket already referred to. A little mercury is poured into the tube so as to establish sure contact with the wires which lead the electricity. When the current is passed the platinum basket becomes white hot, the combustion of the coal is effected, and the gaseous products containing the sulphur compounds are led off through the stopcock and examined chemically. This is practically an improvement on the more complex method originally devised by Berthelot.

Ventilation.

An address was given before the Yorkshire Engineering Society recently by Prof. Ernest H. Jacob, M. D., on the subject of "Ventilation of Buildings." The lecturer stated that six parts of carbonic acid gas were not obnoxious, but 12 parts in 10,000 gave rise to objectionable odor. He showed by means of transparencies the course of fresh air entering hot rooms; that the greater part of the air in supposed circulation is really stagnant, and that this stagnation very usually extends beyond the limits of the breathing line. Consequently the admission of cold air at the base of walls, with exit from the ceiling line, does not necessarily ventilate the room. Touching upon the propulsion and suction systems, he remarked that there are objections to the long air passages of the former system, and showed how the useful area of such passages may be considerably reduced by sharp bends. In pipes with elbows at right angles the reduction of available area is as much as 25 per cent. Some of the best ventilated buildings are those fitted with both propulsion and suction fans. For efficient means of ventilating and heating, he urged that heating radiators should be arranged, so that the incoming cold air could be drawn over the radiators if necessary, or deflected partly over the coils or not at all. It was thought to be better to arrange the heating coils in sections, so that part could be cut off from the heating supply. If the temperature of the air on passing over the coils was greater than that of the air in the room, then it would rise, and in order to promote its circulation it should be drawn away from the base of the opposite wall, to which it enters. If, on the other hand, the air was colder when entering the room, it should be drawn away from the ceiling line of the room. These differences occurred in summer and winter, and air valves should be arranged accordingly.

Curious Egg Tricks.

Some curious tricks can be performed with eggs prepared in the following way: Pierce an egg with a pin and empty the contents of the shell. When the interior is quite dry, pour into it some fine sand until a fourth of the shell is filled. Then seal the hole with a drop of white wax. You can then place the egg on the edge of a knife or the margin of a decanter, and it will stay where you put it. Take care to shake the egg well before placing it in any of these positions, and thus bring the center of gravity to the place where you desire it to be. To make a disobedient egg, introduce into an empty egg shell some grains of shot and sealing wax. Close the hole and hold the shell over a flame until the wax inside has melted. The shot and wax will then adhere at the bottom of the egg. When cool, place the egg on the table and it will stand upright. The egg will be a source of mystery to your friends, as it will refuse to assume any other position.

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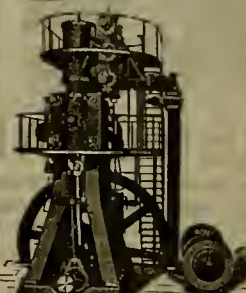
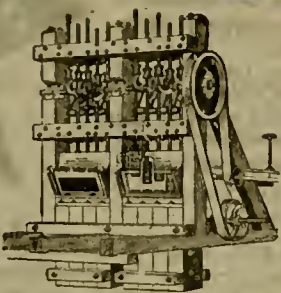
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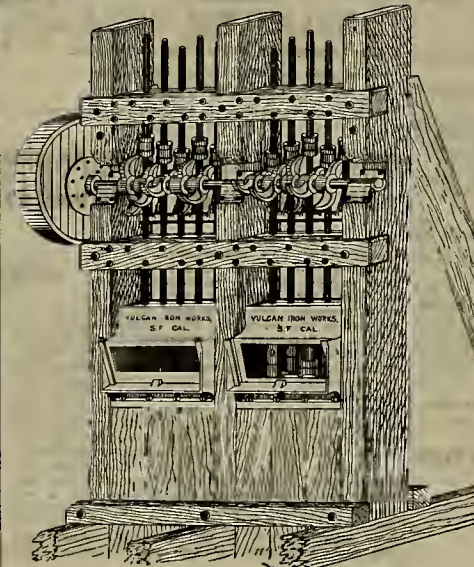
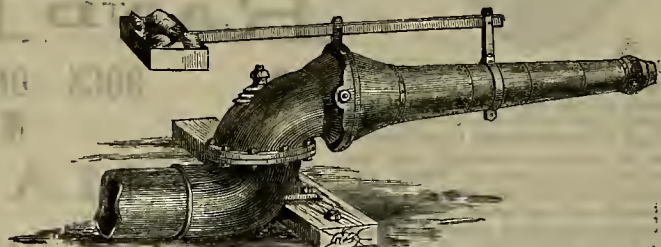
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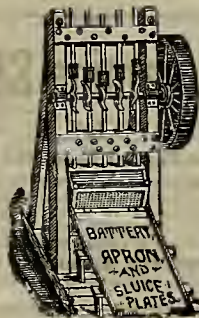
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Mining Summary.

The following is mostly condensed from journals published in the Interior, in proximity to the mines mentioned.

CALIFORNIA.

Amador.

THE AMADOR GOLD.—*Ledger*, March 23: The litigation concerning the possession of the Amador Gold mining property seems to be only at its commencement. Vincent Neale, the present holder as a redeemer of the sheriff's deed in the sale under the decree of foreclosure of the lien actions, being satisfied of the correctness of the decision in the Superior Court denying his motion for a writ of assistance, has decided to take no appeal from it, but instead, on Saturday last, filed in the clerk's office a petition for leave to file a supplemental complaint in the nature of a bill of revivor in the original lien actions.

An examination of the complaint filed presents an interesting question of law. After setting out in full the history of the foreclosure suits against the Amador Gold Mine, Limited, it recites that the Amador Gold Mine was the predecessor in title of the Amador Gold Mine, Limited, and claimed title to the property during all the time for which liens were claimed as being done, and never gave notice that it would not be responsible for the payment of it, and also that the motion for a writ of assistance to dispossess the Amador Gold Mine was denied on the ground that the Amador Gold Mine was not a party to the lien actions, and was therefore not bound in the decree obtained in them. Mr. Neale therefore asks that the sheriff's deed be set aside and that he be allowed to file a supplemental complaint in the original foreclosure actions to include the Amador Gold Mine so as to bind it by the decree.

The Hardenburg was shut down several days and work was commenced again Thursday afternoon. The shut down was occasioned by the mine making more water than the hoist could handle. They have encountered a small bunch of rock in the north drift which they are following in the hope that it will become permanent. On the surface they are doing some grading for a new hoist.

The New York mine, formerly the property of Anderson & Stewart, has been reorganized under the name of Evening Star Mining Company. Mr. Anderson will still remain superintendent, and it is intended to commence work upon the 1st of April.

The Gwin mine proposition is in good shape, and work will commence there upon the 1st of April.

Butte.

SINKING ANOTHER SHAFT.—*Forrestown News Era*, March 22: The owners of the Golden King mine, Messrs. Quick, Crossman and Ky-nock, are sinking another shaft on their ledge. This shaft is being sunk at the northern boundary of their location, just below the schoolhouse. They are now down 30 feet and have had the ledge for 20 feet; it is about four feet wide. The rock shows well in sulphurets and carries considerable free gold. This company has now three shafts on their location, one at each end and one in the center, and in all of these they have found the ledge, with the same kind of rock and about the same width. The company will follow the ledge down some distance in order to ascertain the true pitch, so as to obtain the basis for starting a tunnel to tap it at a much lower level. It is proposed to start a tunnel below Main street. The tunnel will have to run between three and four hundred feet before it will tap the company's grounds, at the extreme northern point and at a depth of 250 or more feet. It is also thought that enough rock will be taken from the shaft to have a milling test made of its value. This is one of the easiest mines to work to be found in the district, as it runs along a sidehill, following a ravine the entire length of the location, and can be tapped by tunnels from the ravine at almost any point and at considerable depth.

Much development work on quartz locations is now going on in this vicinity. The closing down of the Shakespeare and Golden Queen mills released quite a number of workmen who have been putting in their time prospecting ledges located by themselves. Some good rock has been found. With the putting of men at work on the Shakespeare mine and the starting up of the Golden Queen mill, many of these prospectors will find employment, but the work they have done on their locations will be of great benefit in determining the value of many ledges, and will probably enable some of them to make a sale of their property. Taking the camp as a whole, the outlook for a lively summer was never better.

It is reported that work at the Shakespeare mine is about to be resumed. This, if it should prove true, is good news, as it will give employment to quite a number of men and greatly revive our camp.

Reports from the Bullion mill are very encouraging. Under the skillful charge of Mr. Peterson, as amalgamator, good returns are being realized.

The Denver mill is being run to its full capacity and, as far as we can learn, with very satisfactory results to its owners.

The development work at the Golden Queen mine is in good ore, and it is quite likely that the mill will soon be running again.

The Beehive mill, at Mt. Hope, has not yet started up, but work is progressing very favorably at both mine and mill.

Calaveras.

AT THE ECLIPSE.—*Echo*: In this mine the shaft is 189 feet deep, and crosscutting east and west from the shaft is now in progress. Mr. Flagg, the superintendent, informed us that he

believed the ore body would soon be tapped, and when this was done he would give us information that would astonish the natives. The Eclipse is a good mining property. The stockholders of this corporation need not fear of developing a good mine. It is there, and if they continue in their onward march they will sooner or later realize the benefits that shall accrue from their output.

THE GWINN BOND.—*Amador Record*: F. F. Thomas, Hon. Wm. M. Gwin and David McClure, J., were in Sutter Creek last week as guests of Senator Voorhies. On Saturday they all visited the Gwin mine, which is located just across the Mokelumne river, below the Big Bar Bridge, with a view to taking preliminary steps for opening the mine in a systematic manner.

The property has been bonded to Mr. Thomas for four years for \$100,000. Machinery will be put on capable of sinking the shaft 1500 feet. Mr. Thomas and his associates are negotiating with the Blue Lakes Water Company in anticipation of securing water from the Amador side for electric power at a small outlay. The water company owns a site with a fall of 1000 feet, just below the Big Bar bridge, where dynamos, etc., can be located. It is estimated that the cost of the necessary apparatus for generating electrical power would be from \$10,000 to \$15,000, and if this is found to be less than water can be obtained for from the Foreman ditch, in Calaveras county, this plan will be adopted.

The Gwin mine has not been worked for the past thirteen years. Owing to mismanagement and inadequate machinery, water was allowed to accumulate and the underground workings became so dangerous through cavings that work was abandoned, the owners not having money enough left to handle the property. The chute of ore in the mine was over 1000 feet long and of good width. The shaft at the time of the abandonment was down 1300 feet, and it is proposed to pump and clean this out and sink it to a further depth of 200 feet.

The reopening of this mine is not altogether an experiment by any means, as it has been explored sufficiently to demonstrate the existence of a large and valuable body of ore. There has been talk at frequent intervals for several years of the mine starting up, but until now no active steps have been taken in that direction. Mr. Thomas, the holder of the mine, has the financial backing, the experience and the energy to develop the property for all it is worth. His career as a mining superintendent has been a brilliant one. After organizing the present Kennedy Company and reopening that now bonanza mine, in which he is still interested, he went to Australia, where he assumed the management of a silver mine. In a short time he had the property on such a paying basis that the stock increased in value from \$2.50 to \$75 per share. He was soon superintending three mines and receiving a princely salary. Within two years Mr. Thomas' signature was good at a bank for over \$100,000, and it is said that when he returned to Amador county he brought with him at least a quarter of a million dollars. He told a friend that if he had had a few thousand dollars to invest when he first went to Australia he could have cleaned up a million dollars in a short time.

It is calculated that an expenditure of about \$75,000 will be required to properly open up the mine. Jackson will be the base of supplies and the principal headquarters of Mr. Thomas and his employees.

THE NEW HOSPITAL.—*Echo*: The new hospital now being erected in this town on South Main street is nearing completion. The building is 40x40 feet and has a basement nearly in equal proportion. There are two wards, ample to accommodate eight patients. All the modern appliances pertaining to a hospital will be put in this building. Patent closets 6x6 are being constructed, and the very latest styles of washstands are being put in the wards, in fact throughout the building. Dr. J. R. Dorroh is doing the general planning of the building and the architects are following his instructions. Dr. Dorroh was instrumental in having this building erected, and upon his wise suggestion the Utica Mining Co. is having the work done.

Humboldt.

NEW RIVER CAMP.—*Blue Lake Advocate*: Latest news from New river mining camp is to the effect that the Sherwood is not running, on account of the delay in settling up the estate of young Wils. Sherwood, who was accidentally killed last July while celebrating the Fourth, he, it appears, having been the principal owner of this valuable mine. As soon as all probate business shall be settled, operations on the claim will be resumed.

The Boomer still maintains the rank as one of the best mines in the camp.

Inyo.

GOLD ORE.—*Index*: At each of eight claims in Fish Springs district there are now on the dumps from 15 to 30 tons of gold ore, assaying in gold from \$40 to \$80 per ton, which does not include the value of the sulphuretted ore which abounds. There is a fine opening there for some enterprising millman to put in modern works, with thousands of water power to run them. The boys could then keep on mining and let their four ancient arrastras rest.

Kern.

REDROCK AND GOLER.—*Inyo Index*, March 23: From Jake Schober, who returned Tuesday evening from the gold fields, we learn that matters there are quiet. But little work is at present being done in the forty or fifty dry washes, as the ground is too wet. Many of the stories told of the richness of the mines are greatly overdrawn. Three or four of the Schroder and Brockman claims, which number seven in all and are four miles west of Goler, have been prospected enough to prove that they will pay \$5 a day to the man. At that

point bedrock is found from six inches to three feet under the surface. A. Cruee and Mih. Hall are working in the vicinity, and Clark, Drake, McDonald and Wilder, of Bishop, are prospecting. H. A. Burgess has several claims, one of which he has lately bonded for \$800. One of the richest claims is owned by a number of Mexicans, who take out from \$50 to \$100 a day. At Iuyo Canyon, Redrock, Sullivan & Black have ten men at work, and will soon double this force. The gold taken out in the camp is sold for \$17.50 per ounce. The principal settlement is at Redrock, where there is a store, a restaurant and a saloon, and eight or ten tents. At Sullivan & Blacks there is a store and a saloon and fifteen or more tents. At Miller's stage station there is a store and a saloon, and Bonanza Gulch has half a dozen tents. These are all within a mile or two of what is termed Redrock, which is 18 miles from Goler. Two petitions have been circulated for the establishment of postoffices there. There is no use for anybody to go to that country expecting to find claims, as the most of the country is said to be located for sixty miles off east toward Death valley. Asa Hall has struck a deposit of colemanite, or crude borax, near Goler.

Nevada.

BONU ON THE BOSS.—*San Juan Cor. Herald*: The bond on the Boss mine expires some time during the next 30 days. The parties to whom it was bonded will doubtless be on hand and in readiness to take the property, and will, without doubt, profit by the transaction, as they have had it bonded for nearly six months, during which time they have demonstrated that this mine can be made a dividend paying mine. Although the ore is of low grade, the vein is an extensive one and the ore is easily mined and milled. A larger plant will probably be put up on this mine, which will bring the long looked for good time to San Juan and vicinity.

GOOD ORE.—*Grass Valley Telegraph*: Mr. Martin Lahey brought some very good ore to town and was showing it around among miners and mining men generally. The ore came from a ledge owned by Mr. Lahey, and is located at Allison Ranch. The rock came from the croppings and it showed fine gold freely.

GEANITE HILL MINE.—*Telegraph*: Superintendent Denver Waggoner informs us that work is going on finely out at the Granite Hill mine. They are so rigged now that they are lowering the water rapidly, and have got it down to a depth of 160 feet.

OSBORN HILL MINE.—*Telegraph*: The mechanic and mill-builder who has been in the employ of Mr. Grayson for a number of years is now engaged in selecting machinery for the new 20-stamp mill to be placed on the mine. Mr. Grayson informs us that the mill will be built as soon as the lumber and machinery can be obtained, and that when completed it will be as fine a mill as there is anywhere.

GASTON RIDGE MINE.—*Telegraph*: The Gaston Ridge mine will soon be worked in an active way. The Gaston Ridge has lately been called the California and is near Graniteville, and Patrick Foley was the superintendent. Alvinza Hayward and other capitalists are interested in the property and they will soon put a sinking plant on the ledge and will develop it to its fullest extent.

RICH STRIKE AT THE PITTSBURG.—*Transcript*: A rich strike was made at the old Pittsburgh mine, near this city, on Saturday. A fine pay shoot was encountered on the 500 level, the rock from which shows considerable free gold and sulphurets of high grade. Specimens of the quartz were being exhibited in town to day. Some very rich rock was taken from the Pittsburgh years ago, but the pay shoot was worked out; and, although a great deal of prospect work has been done there since by other companies, the results in the main have not been very satisfactory.

A QUARTZ BOOM.—*Transcript*: Quartz mining has a boom at North Bloomfield, and considerable prospecting is being done in that section. New locations are being made every day. The Busy Bee Company and the White Diamond have found good pay rock and are employing several men. The White Diamond Company have ordered a new pump, which is expected to arrive any day. The district heretofore has been considered a poor one for quartz, but developments now being made indicate that there is good rock in some places and it is thought this branch of mining will yet assume respectable proportions.

Plumas.

QUINOX MINING AND WATER CO.—*National Bulletin*, March 24: The first of the week, by courtesy of Messrs. Jas. O'Brien, W. C. Ralston and A. B. White, directors of the Quinox Mining and Water Co., we visited the scene of their proposed operations and examined the work done in and about the mine, particularly the restraining dams erected and the dumping ground for the debris. Last year these gentlemen purchased the ditches, reservoirs and extensive gravel deposits owned by the old Plumas Mining and Water Co. and situated near Spanish Ranch, the center of one of the best gravel-mining sections of the State. The system of reservoirs and ditches covers and controls an immense area of rich gravel deposits, about 2200 acres of which the company now owns. In these, undoubtedly, there are millions of money awaiting extraction by the hydraulic process. During the past six months the company has been very actively engaged in putting everything in readiness for operations this spring. For a time it employed directly about 70 men, and many more indirectly, thus expending a great deal of money, probably \$25,000, up to the present, most of which has been scattered among the farmers, laborers, teamsters and business men of Plumas, much to their benefit and the general prosperity of the county. The company will have, during the

coming spring and summer, about 25 men in its employ continuously, and during the time consumed in erecting the large stone dam at the Devil's Elbow, many more hands will be at work.

The mining to be done the coming spring and summer will be confined to Gopher Hill. To restrain the debris and avoid any possible damage to the lands of this valley, a series of four restraining dams has been constructed. The longest and most massive dam is near the mouth of Wapuansee creek, and consists of two parallel walls of big logs, 265 feet long, tied together and filled in between with rock and brush.

In the center of the ravine this crib dam is 11 feet high. The whole structure is a model of strength. The massive logs at the bottom are lying on and bolted to the bedrock.

Each successive layer of logs is bolted to that underneath. The ties are also bolted. Two tons of large iron rods were used by the company in building the four dams. In structure, the other dams are similar to the one just mentioned. We see no possibility that they will give way. They are intended to restrain such material as may be washed down from the main dumping ground above them—to act as settling dams for the finest material, thus preventing any injury to lands in American valley during the coming season, until the erection of the large stone dam and spillway at the Devil's Elbow. Above all of these dams in Wapuansee lake, so called, is a large area, probably a third of a mile long and one-fourth of a mile wide, which will form the main dumping ground to be used by the company this season. This, by the use of flumes, will be filled up as occasion requires, and the debris from the mine most effectually stored where there is no possibility for it to get away, even if there was a far greater quantity of water in Wapuansee ravine than there is. On parts of this flat is now stored debris, probably 100 feet deep in some places. It has not moved—cannot move; it has become cemented or solidified to a large extent and will remain there.

The Quinox Mining and Water Co. has just completed 600 feet of sluice boxes of a very substantial character, four feet wide. The bottom is lined with rock to a depth of about 14 inches. This rock lining will take the place of blocks, and is considered far superior to them. In Placer and Nevada counties, rock lining is used almost entirely. Above this fluming is about 1000 feet of bedrock tunnel reaching up to the gravel banks, which are about 150 feet high. In the claim are six "giant," large and small, to be used at different points. These are supplied from a main pipe 22 inches in diameter, under 350 feet pressure. Of 22, 15 and 11-inch pipe, there is on the claim 3300 feet.

The Commissioner came as far as Beckwith last Friday, but Dr. Leonard gave them such an impression about getting over the road from that place to Quinox that they concluded to defer the trip a few days until the roads improved, and accordingly they went back to San Francisco. They will return here in a short time, pass upon the restraining works erected by the Quinox Mining and Water Co., and if these prove satisfactory, grant the license to mine.

Riverside.

LAKE TIMBERS.—The largest timbers ever shipped to southern California were sent from Riverside to the Good Hope mine, near Perris, on the 8th instant, by the Russ Lumber and Mill Company. They were 26x29 and 32 feet long and four in number. They will be used in the foundation of the new 20-stamp mill. The erection of the mill will consume 100,000 feet of lumber, and seven teams are now engaged in hauling it to the mine.

San Bernardino.

A RAILROAD NEAR.—James Campbell has returned to Los Angeles from Needles and Vanderbilt, two places that are now attracting some attention. Mr. Campbell says that the Nevada Southern Railroad is in good order and regular trips are made to Manvel, which is four miles from Vanderbilt. Two mills are now being constructed—one by Mr. Campbell of Salt Lake City, and the other by Messrs. Paten & Taggart will be in running order within a week. These mills are complete in every particular, and will be a credit to the owners. The mines on which these mills are erected have been fully tested by milling process in Denver, Pueblo and other places. The owners have no fears of the result from their own mills, and have estimated that the ore in sight will keep them running for one year and the average value at \$60 per ton, which goes to show that when the Nevada Southern is finished to the Keystone mill, more stamps will be added to the present mills and new mills and smelters constructed. There is now a party of engineers and a gang of men and scraper teams at work between Manvel and Vanderbilt.

STAMP MILL STARTS.—*Shaft*, March 15: The announcements made last fall by A. G. Campbell and by Patton & Taggart that upon the property of each a ten-stamp mill would be erected was hailed with delight generally. The culmination of hope occurred, however, when Campbell's mill started last week and anticipation was turned to realization. The first clean-up, which occurred after a 40-hour run, resulted in a \$500-bar of gold, 950 fine. The concentrates for the 40 hours will yield \$150. The tailings went \$240. The mill is a ten-stamp Fraser & Chalmers mill. The stamps weigh 750 pounds each, have a seven-inch drop and they drop 90 times per minute. The mill is fitted with Evans concentrators. The power is furnished by two 50-horse power boilers and a 100-horse power engine.

THE BOOMERANO.—W. F. McAdams, the genial foreman of Campbell's mines, almost fainted away the other day when he went down to the 260-foot level in the Boomerang and found that a vein of rich ore over three feet in

width had been opened up. The vein still continues to be of that width.

V. M. AND M. COMPANY.—When the main shaft of the Bronze had reached a point about 50 feet below the lower level last week, Foreman Sauerbrey noticed that the ore was of a different character and took a specimen to the surface, which, when assayed, showed a value of \$1117.38 per ton. The next day he took two samples, which he selected carefully in order that he might get only an average. These two samples with the other made an average of \$342.62 per ton in gold. The character of the ore remains unchanged. The mill at the Bronze will be running very soon.

THE ST. GEORGE.—The work of cleaning up the St. George in preparation for its inspection by Mr. Schofield, who has a hand on it, is about done. It has been a long and difficult task, and its end will not increase the sorrow of any one. It will be examined immediately upon the completion of the work.

NEVADA.

Washoe District.

SUMMARY OF COMSTOCK OPERATIONS.—Following is a summary of last week's operations on the Comstock mines from additional official reports:

In the Consolidated California & Virginia mine, on the 1650 level, the drift running north from the end of the crosscut run east from the drift run north from the east crosscut No. 1 from the north drift from the winze—down 52 feet—has been extended during the week 13 feet; total length 50 feet, continuing in porphyry, clay and quartz of low assay value. Have extracted from the workings in the vicinity of the winze—down 20 feet—17 tons of ore assaying \$51.40 per ton. Are doing some necessary repair work in the main south drift and openings therefrom on the 1600 level. 1000 level—the Rule drift—The upraise from this drift, started at a point 353 feet south of the shaft station, has been carried up during the week 26 feet; total height 66 feet, continuing in porphyry, clay and quartz of low assay value. East crosscut No. 3, started 20 feet south from the upraise, has been advanced ten feet in a quartz and porphyry formation of nominal value. East crosscut No. 2, started from the drift at a point 527 feet from the shaft station, has been extended 25 feet; total length, 85 feet; face in porphyry, clay and quartz of low assay value.

In the Ophir mine, on the 1465 level, the west crosscut on the north drift is in 48 feet, and continues in porphyry and clay seams. An advance of 38 feet has been made during the week in reopening and repairing the old Central tunnel, making the total length in a westerly direction 974 feet. From this point they have reopened and repaired in a northerly course 58 feet. Have continued (jointly with the Mexican Company) the work of making repairs to the main shaft. On the 1465 level of the Mexican mine and upraise, near the mouth of the west crosscut from the south drift, from the upraise 45 feet above the sill floor of this level, is up 40 feet. The top is in porphyry showing lines of quartz. On the 900 level of the Union shaft and Sierra Nevada joint east crosscut near the north line of the Union mine, started from joint north drift, which was run from the joint west drift at a point 1520 feet west of shaft, has been extended during the week 14 feet; total length, 170 feet; face in clay and porphyry, from which there is a small flow of water. In the Andes mine, on the 420 level, crosscut No. 3 is in 107 feet; formation clay and quartz.

In the Best & Belcher mine, on the 900 level, the east crosscut on the north boundary has been advanced 18 feet, passing through hard porphyry; total length, 431 feet. In the Hale & Norcross mine, on the 900 level, they have finished cleaning out and repairing the main south drift on this level, and resumed work in the face of same. Advanced this drift during the week 6 feet; total length, 147 feet; face in porphyry. 1100 level—Repairs to the main south drift on this level have been completed, and have resumed work in the face. This drift was extended 6 feet the past week, making its entire length 142 feet; face in porphyry. In the Kenton Con. mine, on the 1100 level, they have made the air connection with the 1035. Have started to follow southward the ore streak encountered in the raise. On the 1200 level the joint lateral drift with the Yellow Jacket in the west ledge is out 22 feet; face in gold ore of milling grade.

Potosi.—The south drift on the 450 level has been advanced 24 feet; total length, 252 feet. The drift is following a streak of ore 12 inches wide of good quality. The raise from the 450 level is up 32 feet; top in clay and low-grade quartz.

Chollar.—The north drift, 100 level, is now out 60 feet; the face is in clay and low-grade quartz. On the 100 level, 300 feet south of north line, have started a drift west, which is out 18 feet; face in porphyry.

Sierra Nevada.—The south lateral drift from the intermediate tunnel has been advanced 21 feet; total length, 515 feet; face in porphyry. The joint east crosscut near north line, from the north drift 1520 feet west of the shaft, 900 level, has been advanced 14 feet; total length, 170 feet; face in clay and porphyry, from which there is a small flow of water.

Union Shaft.—The joint east crosscut near north line, from the joint north drift 1520 feet west of shaft, 900 level, has been advanced 14 feet; total length, 170 feet; face in clay and porphyry, from which there is a small flow of water.

Ward.—The west drift from the station, 820 level, Ward shaft, is out 650 feet from the shaft; face in porphyry.

Bullion.—The west drift from the station, 820 level, Ward shaft, is out 660 feet from the shaft; face in porphyry.

Alpha.—Have been engaged in retimbering

the station at the 122 level and the shaft below that point.

Jumbo District.

DEVELOPMENT TO BE PUSHED.—*Territorial Enterprise*, March 24: The increasing demand for gold-bearing quartz veins has spurred on the lagging energies of owners of lode-titles in Jumbo district, and the work of development will be vigorously prosecuted there this year.

The Wild Goose, owned by J. C. Dunlop, has been a steady bullion producer since last summer, and there are now about 100 tons of ore on the mine dump ready for milling that shows an average value of \$20 per ton in gold. There is far higher grade ore in the mine, but the finest quartz is secured.

The ledge in the Wild Goose shows a width of 30 feet of vein matter, but only a part of it is pay. The walls are slate and syenite, and at the water level, 165 feet below the surface, the ledge shows stronger than at any other point. The water is not of great volume, but the cost of setting up and operating a pumping plant to follow the ledge below the water level would involve a greater outlay than the owner cares to invest at present, as the ore resources above the water level are ample to keep the force of three men employed for several months. Heretofore, Mr. Dunlop has had the ore from the Wild Goose crushed in custom mills, but hereafter he will handle it in his own mill adjacent to the mine. The mill has five stamps and can be operated by water power six months out of the twelve.

Captain Berry is extracting some high-grade ore from a vein cut in a tunnel which he has been driving to drain his property, and is now operating through a shaft. The ore saved is said to show an average of \$100 a ton in gold, and is sacked ready for shipment to one of the canyon mills.

C. S. Coffin is going out a little ore from the Pandora which has produced a larger amount of gold bullion than any other location in the district. Work on the Blizzard and all of the principal locations in Jumbo will be resumed next month. The district is conceded to be one of the best fields in the State for prospectors in search of gold-bearing quartz veins, and from present indications there will be more men working there this year than at any time since its discovery.

ARIZONA.

AN OLD MINE FOUND.—The old mine found near Cibola creek, Gila county, by young Edwards and others, says the *Arizona Gazette*, is turning out to be a magnificent property. It has for years been known that somewhere in that vicinity there was an old mine that had been worked by white men to great profit, but until lately its location had not been found. It is not in the canyon of Cibola, where so long it has been sought, but is on the high plain above, about a mile and a half west of Cibola creek and less than that distance north of Salt river. The dump is of large proportions, and the workings were evidently of considerable extent; how deep it cannot be ascertained, for the Indians, as usual with them, had filled up the shaft nearly to the surface. The company working the mine have started a shaft at another point and will tap the ore body below the old workings. The ore on the surface assays about \$35 a ton in free gold. Near the old works is still standing an adobe and stone cabin wherein the white miners of long ago had their residence, and whence they were driven to their death, no doubt, by the terrible Apaches. The mine is but a short distance outside of the reservation line, in a country that is the wildest on God's footstool. Undoubtedly it is rich in precious metals, yet only a small portion of it has been well explored, and in all Arizona it is least known.

THE VEKOL CLOSES DOWN.—*Tombstone Prospector*: Owing to the low price of silver another silver mine has been closed down. This time it is the Vekol of Pinal county. The Pioneer district in Gila county, which has made many chlorides independent for years, has also been totally abandoned.

OVER THEIR NEW ROAD.—*Prospector*: The Copper Queen Co. is piling up its bullion at Bisbee until its new road is constructed or the N. M. & A. makes a better rate. The *Prospector* is informed that the receivers recently appointed for the Santa Fe system are the cause of the trouble between the railroad company and the Copper Queen Co. over rates on bullion shipments.

LOWER CALIFORNIA.

COPPER MINE TO BE OPENED.—A San Diego dispatch, March 23, says: It will not be long until the real extent and worth of the San Fernando copper mine, below San Quintin, Lower California, becomes known. For 15 years this property has lain idle, with just enough water and debris in the shaft to prevent an inspection by intending purchasers without great expenditure of money.

Now, however, through the energy of Prof. E. C. Anthony and his son, a syndicate of Denver capitalists has secured a working bond on the mine, and will attempt its development. The syndicate is represented by General E. C. Humphrey, who has been in this city for some days fitting out an expedition to go down to San Fernando, and, accompanied by Fred Anthony and two mining engineers General Humphrey will leave San Diego to-morrow with an outfit. About 40 tons of supplies will be taken to Escondido on the Pacheco, and from there shipped to San Carlos landing.

It is the opinion of old settlers who are familiar with the property that the mine will develop into one of the best copper deposits on the coast.

OREGON.

GOON REPORTS.—*Baker City Democrat*: The news received regarding the Bonanza and Pyx mines in Robinsonville district is most flattering. A fine body of ore has been opened in the

lower level of the Bonanza and the *Democrat's* informant states that the mine is looking better than ever. "It is a great mine," said he, "and the showing of ore is something grand."

At the Pyx mine a millsite has been graded and lumber is now being delivered on the ground. Very rich ore is being taken out of the Pyx and the ore body is extensive. As soon as the mill is ready for operation there will be no end of ore for reduction.

NEW COAL FIELDS.—*Baker City Democrat*: Mr. S. Grier yesterday called at the *Democrat's* editorial rooms and laid on our table some fine coal specimens, which were sent to him by his sister, Mrs. M. E. Carroll, of Bridge creek, Crook county. Several discoveries have been made in that section and the lodes are showing up in fine shape. The specimens received were taken from a three-foot vein at a depth of 50 feet. Mrs. Carroll writes that the quality of coal improves with depth.

RICH PLACER.—*Bogue River Courier*: Sam Axtell was up from Gelice creek this week. He and Gene Merrill bought a half interest in 40 acres of good mining ground for \$500 and are busy ground-slucing with rich results. The bedrock has not yet been reached, but a phial filled with coarse gold shows that the bank carries colors clear down.

NEW MEXICO.

INSPECTOR'S REPORT.—A dispatch from Washington says: John C. Spears, United States Mine Inspector for the Territory of New Mexico, has submitted his monthly report to the Secretary of the Interior. He reports having inspected the Brown mine, in Chirillos, and found that the laws to ventilation had been complied with, excepting in the case of the main slope. The defect is to be remedied. The White Ash mine was found to be generating fire damp at the left entries. The report is accompanied with the verdict of the Coroner's jury rendered at the inquest on the death of Peter Fochetti, who was killed in the Waldo mine on January 30th. The verdict was that Fochetti came to his death from a premature discharge of shot, believed to have been fired by himself.

The explosion of fire damp in the Blossburg mine, which resulted in the death of four miners and the injury of several, is treated exhaustively in the report. Inspector Spears states that he called the attention of the pit boss and superintendent to the bad condition of the mine. He is of the opinion that the explosion could have been prevented by the exercise of due care after the discovery of fire damp in dangerous quantities. The company operating this mine has been given twenty days in which to comply with the law of ventilation.

UTAH.

MERCUR DISTRICT.—"It will, in time, be the greatest gold camp in America, if not in the world." This is what Tim Driscoll, the well-known miner, said of the Mercur district. Mr. Driscoll had just returned from Mercur, and has thoroughly investigated the wonderful gold fields. He further said to the *Salt Lake Tribune* reporter: "It is the most peculiar camp in the world. Scarcely one practical miner out of a thousand would consider the rock of any value as gold-bearing rock."

"The dirt or rock may be pounded and panned without getting a color of gold, but after witnessing the process of extracting the gold and seeing the water that comes out as clear as spring water and examining the zinc shavings after the water or cyanide solution passes through them, and finding them coated with gold, you would not only be staggered but also firmly convinced that there is also a new feature and a new field in gold mining; also that the two recent rich strikes, one at the Sunshine, three miles west of the Mercur, and the other at the property owned by the Electric Light Company of this city, three miles south of the Sunshine, goes to prove that there is an extensive and inexhaustible field of the same quality of ore extending over a broad area of country."

WASHINGTON.

RICH PLACER.—Some wonderfully rich placer diggings are being worked in the upper Big Bend of the Columbia. O. B. Williams and J. W. McCreary arrived at Revelstoke on snowshoes from French creek last Saturday, making the 60 odd miles in three days. They have taken out considerably over \$6000 from the Consolation mine, the result of four men's work since December 1st. The pay streak is 25 feet wide, and with three shifts can easily work between 30 and 40 men. By actual test the gravel averages clean through the pay streak \$15 a day to the man, and there are some 3500 feet of the mine yet untouched. About a quarter of a mile below the Consolation the Vandall people have struck a bonanza. They have a tunnel into the bench, and have struck the rim rock of an old channel. How much they have taken out so far is unknown to Messrs. Williams and McCreary. Williams went into the tunnel the day they left, and the owners, as an illustration of the mine's wealth, cleaned up about \$100 off the bedrock while Williams was standing in the drift.

Complimentary Samples.

Persons receiving this paper marked, are requested to examine its contents, terms of subscription, and give it their own patronage, and, as far as practicable, aid in circulating the journal and making its value more widely known to others, and extending its influence in the cause it faithfully serves. Subscription rate, \$3 a year. Extra copies mailed for 10 cents, if ordered soon enough. If already a subscriber please show the paper to others.

—It is again reported that a contract has been signed for the construction of a railroad from Portland to Astoria, Or.

Industrial Education.

James Spiers, President Fulton Engineering and Ship-Building Works, in *Evening Bulletin*.

Noticing in a recent issue of the *Bulletin* an editorial on the Wilmerding, Cogswell and Lick schools, for the purpose of educating our youths and preparing them for industrial pursuits, prompts me to write to you on the subject, having given it considerable thought during my experience as a mechanic and knowing the difficulties experienced by boys in learning a trade and combining with it that education which enables them to reach the highest positions.

The object of all these gentlemen was evidently the same; that is (taking into consideration their condition), to teach youths how best to earn a living. Such institutes should take our youths just as they come from the grammar schools and give them such a course of instruction that at the end of four years they are prepared to earn their living.

This end cannot be accomplished by the courses generally pursued in similar institutions, as the students coming from such, going into our workshops, are on an average in no better condition to earn a living than apprentices who have been six months at the trade. They are better versed in the sciences than the six-months apprentice, but no better in their ability for practical work.

The ability by educated experience to do practical work is a more potent factor in earning a living than the possession of scientific knowledge, however desirable it may be. A knowledge of the higher branches of mathematics and physics is exercised by but a very small percentage of our artisans, and, therefore, the aim ought to be to reach the masses, while at the same time paving the way for those who will reach out and go higher. To do the greatest amount of good, education in practical work should be followed out very much in the same way as in our regular workshops.

Institutes of this kind, so far, have been organized by attaching workshops to the college. In such workshops the work carried on is experimental and does not make workmen. These workshops are carried on more for the purpose of making experiments in testing material and making fancy articles, and always seem to me to be playing at work instead of doing work. What I think should be done is to build workshops and attach the classes to them. Organize them to do work similar to that of the regular business workshops of the country; to manufacture articles for sale, such as tools, engines, wood-working machinery and articles of common use, whatever the branch of industry may be, so that apprentices while learning are producing, and are at the same time acquiring those habits of industry which go to make the first-class workman. Such workshops should be so organized that the day would be divided in two, the first half being used for practical work, and the other half for study, the hours employed each day to be not less than five, which would at the end of four years enable a youth of ordinary intelligence to master the trade. Five hours each day exercised in practical working for four years, under instruction such as should be given, will be as valuable as nine hours in the ordinary shops. The opportunity given for scientific study in the afternoon will, during the four years, enable those students who will naturally forge ahead to reach as exalted positions as can be reached through any other channel.

In consideration of apprentices, while learning, being producers, I think they ought to be paid during the third and fourth years of their apprenticeship.

The articles manufactured, being of common use, will be sold from time to time, and the proceeds apply in a great measure to the supporting of the institute.

During the first years of their instruction, with little experience, it will be necessary to introduce a few good workmen in addition to the foremen, and it may be necessary to have a few all the time, but by the time that the junior and senior years are reached the number of experienced workmen can be reduced, the juniors and seniors by that time being sufficiently experienced to take their places.

It is unnecessary to discuss all the details of such a plan in this letter, but it is a subject to which I have given considerable thought during my experience with workshops and apprentices. I do not write this for the purpose of showing that workshop education is more important than college education, but simply to show that in such a plan as Mr. Wilmerding's its purposes can best be carried out as I have outlined; the workshop coming first and the higher branches of education being second. For professional men, and men whose

lives are to be devoted to science, the practical education cuts but a small figure, and to them is of small importance. In all cases the education should be of such a nature as to best suit the class which it is intended to assist.

JAMES SPIERS.

Market Reports.

The Markets.

SAN FRANCISCO, March 29, 1894.

No new feature has developed in silver during the week, the range of quotations being singularly uniform. At this writing (Thursday) it is regarded as certain that the President will veto the Bland sealage bill, and there is no probability that it can be passed over his head. The effect of the veto on the market appears to have been fully discounted, as, indeed, have all other adverse influences. Talk of the rehabilitation of silver by European countries and by Mexico have been events of the week, but they have so far resulted in no definite move looking toward international bimetalism.

Lead.

The lead market has suddenly strengthened, due to the favorable action of the Senate committee on the tariff. The advance has been from .2 to .3 of a cent per pound, sufficient to encourage the miners very much. At this figure it will be possible for some large mines, now shut down, to operate without loss.

There is no change in copper.

New York Prices.

NEW YORK, March 29.—Following are the closing prices for the week:

	Silver in London, N. Y.	Copper.	Lead.	Tin.
Thursday.....	27 1/4	59 1/2	9 5/8	3 45
Friday.....	27 1/4	59 1/2	9 5/8	3 45
Saturday.....	27 1/4	59 1/2	9 5/8	3 45
Sunday.....	27 1/4	59 1/2	9 5/8	3 45
Monday.....	27 1/4	59 1/2	9 5/8	3 45
Tuesday.....	27 1/4	59 1/2	9 5/8	3 45
Wednesday.....	27 1/4	59 1/2	9 5/8	3 45

San Francisco Metal and Coal Market.

ANTIMONY.		QUICKSILVER.	
Per lb. @ 13	Home trade, pr.	Per lb. @ 13	Home trade, pr.
Refined, in car lots @ 74	STEEL.	Refined, in car lots @ 74	STEEL.
Powdered, do. @ 74	English, B. @ 20	Powdered, do. @ 74	English, B. @ 20
Concentrated, do. @ 74	Canter tool, @ 84	Concentrated, do. @ 74	Canter tool, @ 84
All grades, jobbing at advance.	Pick & Hammer @ 10	All grades, jobbing at advance.	Pick & Hammer @ 10
COPPER.		COPPER.	
Boiler, @ 23	Machine, @ 4	Boiler, @ 23	Machine, @ 4
Sheeting, @ 23	Toe Calk, @ 42	Sheeting, @ 23	Toe Calk, @ 42
Ingots, jobbing @ 20	PIC TIN @ 22	Ingots, jobbing @ 20	PIC TIN @ 22
Do, wholesale @ 16	Spot @ 22	Do, wholesale @ 16	Spot @ 22
IRON.		IRON.	
Bar, base @ 21	Spot FROM YARD—PER TON.	Bar, base @ 21	Spot FROM YARD—PER TON.
Norway, base @ 44	Wellington @ 80	Norway, base @ 44	Wellington @ 80
PIL IRON.		PIL IRON.	
Spot @ 22	Crete @ 7 50	Spot @ 22	Crete @ 7 50
Eglington @ 22	Nanaimo @ 6 50	Eglington @ 22	Nanaimo @ 6 50
Olenark @ 22	Seattle @ 6 50	Olenark @ 22	Seattle @ 6 50
Am. Soft No. 1 @ 22	Canter @ 6 50	Am. Soft No. 1 @ 22	Canter @ 6 50
Shot No. 1 @ 22	Canter @ 6 50	Shot No. 1 @ 22	Canter @ 6 50
Puget Sound @ 22	Egg, hard @ 12 00	Puget Sound @ 22	Egg, hard @ 12 00
Olay Lane White @ 22	Walsend @ 7 25	Olay Lane White @ 22	Walsend @ 7 25
Langdon @ 22	Scotch Split @ 8 00	Langdon @ 22	Scotch Split @ 8 00
Carlsberg @ 22	Brymbo @ 7 50	Carlsberg @ 22	Brymbo @ 7 50
Barrow @ 22	West Hartley @ 7 50	Barrow @ 22	West Hartley @ 7 50
Carlsberg @ 22	TO LOAD—PER TON.	Carlsberg @ 22	TO LOAD—PER TON.
LEAD.		LEAD.	
Fig. @ 41	Australian @ 6 50	Fig. @ 41	Australian @ 6 50
Bar @ 41	Liverpool Steam @ 6 50	Bar @ 41	Liverpool Steam @ 6 50
Sheet @ 41	Scotch Split @ 7 00	Sheet @ 41	Scotch Split @ 7 00
Pipe @ 41	Cardiff @ 7 00	Pipe @ 41	Cardiff @ 7 00
SILVER.		SILVER.	
Drip, sizes smaller than B @ 75	West Hartley @ 7 50	Drip, sizes smaller than B @ 75	West Hartley @ 7 50
Do, B and larger sizes @ 75	COKE.	Do, B and larger sizes @ 75	COKE.
Do, bag of 25 lbs. @ 2 00	English, to load, @ 50	Do, bag of 25 lbs. @ 2 00	English, to load, @ 50
Do, bag of 25 lbs. @ 2 00	Do, spot, in bulk, @ 41	Do, bag of 25 lbs. @ 2 00	Do, spot, in bulk, @ 41
Do, bag of 25 lbs. @ 2 00	Do, in sacks, @ 41	Do, bag of 25 lbs. @ 2 00	Do, in sacks, @ 41
Do, bag of 25 lbs. @ 2 00	Cumberland @ 9 50	Do, bag of 25 lbs. @ 2 00	Cumberland @ 9 50

Mining Share Market.

SAN FRANCISCO, March 29, 1894.

The Comstock market has been in a weak condition for the past week, and prices have almost uniformly declined. The best sustained and most active stock during last week was Potosi of the middle group, which had some lively fluctuations, mostly on a small scale. The official letter from the Potosi mine for the past week, a copy of which is published below, states that the south drift on the 450 level is following the ore streak encountered two weeks ago, and the ore in the face of the drift is 12 inches wide and of good quality. Private advices report that the ore assays from \$100 to \$200 per ton. This ore streak has been of varying width and has been followed by the drift for nearly 60 feet from the point where it was first found. In the opinion of people who are familiar with the Potosi mine it constitutes a very hopeful prospect, the best, perhaps, now visible in any of the Comstock mines.

Tuesday the difference between the price of Consolidated California and Virginia and Ophir, which has been narrowing for several weeks past, got down to ten cents for when Con. California sold at \$2.50 Ophir brought \$2.40. People who made bets a week ago that Ophir would sell higher than California were greatly elated.

Yesterday the Comstock market had a sharp decline at the opening. A combination of Board brokers who were among the thirteen who voted against the amendment to the Constitution permitting fluctuations of 1 cent in stocks selling below \$1, slaughtered stocks to prove, as one of them intimated, "that the rule was a bad one and should be repealed."

—Capitalists have a scheme to furnish electricity to Stockton for manufacturing purposes. It is proposed to generate the power in the Stanislaus river above Knight's Ferry.

—Most of the Mare Island shops are expecting a heavy reduction in force by April 1st. It is true that there is a big job on the Boston, but there is no money to carry on the work.

Coast Industrial Notes.

—Electric signals are being put up by the railroads at the street crossings in San Jose.

—After nine weeks of boring the Healdsburg Trust Company has struck water at a depth of 280 feet.

—A returned prospector from the Goler and Red Rock camps tells a new story. He says there is little gold in that section. He declares the reported finds at Black Mountain to be "fakes."

—A company has been formed at Riverside to erect a 400-room hotel. The capital stock of the corporation is \$450,000. The building will cost \$200,000, and work will be commenced soon.

—The Portland City Water Committee has asked for proposals for the construction of four reservoirs, to cost over \$500,000. It has ordered the sale of \$1,500,000 bonds to carry on the work.

—Indian creek dam, Idaho, the hurstling of which caused such a havoc recently, was not destroyed. The damage can be repaired for a few thousand dollars. The water was more than twenty feet from the top when the accident came.

—The rails of the Southern Pacific Coast line are now laid to near San Luis Obispo. In two weeks the bridge will be in place. Indications point to the continuance of the work south. Strangers are flocking to that section, spying out the country.

—Hon. W. J. Mills of Pocatello, Idaho, read a paper at a session of the State Irrigation Committee in which he stated that the government, by expending \$10,000,000 could reclaim Snake river valley lands and provide homes for 250,000 people.

—For some months past a party of surveyors has been at work surveying the channel of the San Gabriel river, from its mouth at the ocean to the San Gabriel canyon. It is stated that the intention of the Board of Supervisors is to give employment to the idle men of the county at a nominal sum.

—Representative Wilson of Washington is making inquiries as to the contract which the Treasury Department is said to have made with the British Coal Company for supplying \$100,000 worth of coal to United States vessels which will patrol Behring sea. Wilson regards the contract as a discrimination favorable to British interests. He says it is especially objectionable in view of America's contention with Great Britain over the Behring sea. Wilson has unofficial information that the contract was made with the Comox mines on Vancouver island, although there are abundant coal supplies in the Puget sound country.

—A census bulletin shows that there are in California 7923 manufacturing establishments. The aggregate capital invested is \$146,797,162, live assets \$66,792,498, averaging number of employees 83,642, total wages \$1,538,780. Operatives, skilled and unskilled—Males above 16 years 50,569, wages \$32,913,974; females above 15 years 69,785, wages \$2,130,192; children 1513, wages \$216,478; piece-workers—Males above 16 years 8496, wages \$4,674,798; females above 15 years 4806, wages \$1,158,850; children 344, wages \$33,626. Cost of material used, \$120,241,025; value of products, including receipts from custom work and repairing, \$213,404,091.

—An important contract was recently entered into by the San Carlos Coal Company of Pittsburg and the Southern Pacific Railroad Company, by the terms of which the former, owning extensive coal lands in Texas, is to furnish the railway company with 115,000 tons annually, 315 tons per day. The transaction also embraces the building of a railroad twenty-six miles in length, at a cost of \$300,000. The property on which the company is now operating consists of 1280 acres of land in Presidio county, Tex., acquired by purchase in fee from the State of Texas, all of which is underlaid with coal, and 55,120 acres held by the company under a lease from private owners in fee for the term of thirty years from May 16, 1892. In addition to this, the company has a lease for twenty-five years on 2,000,000 acres of land situate in the district of Iturbide, Republic of Mexico, on the Rio Grande. Prospecting has been carried on in the Mexican property sufficiently to determine that it contains a bed of coal about fifty miles in length, and from ten to fifteen miles in width. The vein is forty-one inches thick, and of good quality and semi-bituminous in character. It is said that at the mines now open the San Carlos Company can get \$2.50 per ton for coal on the car, and the profit will be about \$1 per ton.

—An important case has just been decided by the Supreme Court of this State involving the title to the Chile Bar Slate Quarry near Placerville under the title of

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COMPANY AND LOCATION.	NO. AMT. LEVIED, DELINQ. AND SALE.	SECRETARY.
Andes S M Co, Nevada.....	43.....25c.....	Mar 6, April 10, April 23.....John W Telge, Nevada Block
Belcher S M Co, Nevada.....	48.....25c.....	Mar 13, April 17, May 8.....O L Perkins, Mills Bldg
Hodie Cons M Co, California.....	17.....15c.....	Mar 10, April 16, May 14.....M E Willis, 414 California
Calandona C M Co, South Dakota.....	13.....50c.....	Mar 6, April 10, May 10.....P G Drum, Mills Bldg
Chandler M Co, Nevada.....	20c.....	Mar 24, April 24, May 15.....Chas E Ridd, Nevada Block
Con Cal & Va M Co, Nevada.....	4.....5c.....	Mar 6, April 10, April 26.....A W Havens, Nevada Block
East Sierra Nevada M Co, Nevada.....	3.....5c.....	Jan 10, Feb 20, Mar 20, May 11.....Geo R Spence, 316 Pine
Kellogg M Co, California.....	7.....25c.....	Feb 6, Mar 12, Apr 3.....Otto tam Soda, 216 Bush
Jackson M Co, California.....	20c.....	Mar 2, Apr 24, May 11.....J F Hinding, Crocker Bldg
Justice M Co, Nevada.....	16.....10c.....	Feb 6, Mar 12, April 2.....K E Kelly, Nevada Block
Martin White M Co, Nev.....	29.....25c.....	Jan 13, Feb 24, Mar 31.....K L Rose, Sup Court Bldg
Overman S M Co, Nevada.....	70.....10c.....	Mar 6, April 10, April 30.....Geo H Edwards, 414 California
Potosi M Co, Nevada.....	41.....25c.....	Mar 6, April 10, May 2.....Chas E Elliot, Nevada Block
Savage M Co, Nevada.....	83.....25c.....	Mar 5, April 9, April 30.....E B Holmes, Nevada Block
Scorpion M Co, Nevada.....	5.....5c.....	Jan 10, April 13, May 4.....Geo R Spence, 316 Pine
Sisaloy Cons Quicksilver Co, California.....	8.....70c.....	Mar 2, April 5, April 27.....Edw F Stone, 316 Pine
Texas Mining Co, Mexico.....	13.....50c.....	Feb 10, Mar 23, April 10.....K J Willats, Flood Bldg

MEETINGS.

COMPANY AND LOCATION.	MEETING.	SECRETARY AND OFFICE IN S. F.	DATE.
Belcher Cons M Co, Nevada.....	Annual.....	L Osborn, Nevada Block.....	April 11
Champion M Co, California.....	Annual.....	J F Hinding, Crocker Bldg.....	April 10
Con. Wyoming G. M. Co.....	Annual.....	W J Curran, 306 Pine.....	April 4

The People, respondent, vs. W. O. Thomas, appellant, an appeal having been taken from an order refusing to set aside and vacate a judgment. The State sold the west half of section 36 as school land to Thomas in 1875, and in 1880, as he failed to make the requisite payments, the certificate was foreclosed and judgment was entered against him. In 1875, Thomas sold the land to the El Dorado Slate Company, but the conveyance was not recorded till August, 1892, nor was the Register of the State Land Office notified. In January, 1887, the State sold a part of the same land to Leonard Reeg, who sold it in 1888 to Mothersole & Perine, who have expended thousands of dollars on it in quarrying, not knowing of the other transactions and being innocent purchasers, while at the same time the El Dorado Slate Co. knew of their purchase and improvements. In January, 1893, the case was tried in the Superior Court before Judge Arnot, an effort being made to set aside the judgment against Thomas on the land. There were some minor irregularities affecting the cancelling of the certificate to Thomas, but the equities were so strongly in favor of the present owners of the land that Judge Arnot refused to set aside the judgment, and the title to the quarry now held by Mothersole & Perine is confirmed.

Board Sales of Mining Stocks.

S. F. Stock Board.

THURSDAY, March 29, 1894.

9:30 A. M. SESSION.

200 Andes.....	17c	100 Iowa.....	5c
200 Belcher.....	50c	200 Mexican.....	1.25
750 B & B.....	1.25	100 Mono.....	5c
200 Bullion.....	29c	300 Potosi.....	74c
200 C. O. & Va.....	2.35	100.....	75c
250 Crown Point.....	35c	100 Savage.....	29c
250.....	37c	400.....	30c
400.....	38c	300 Sierra Nev.....	35c
400 Chollar.....	24c	400.....	35c
400.....	23c	200 Sag Belcher.....	15c
200 G & O.....	55c	550 Union.....	66c
100 H & N.....	44c	50 Yellow Jacket.....	63c

2:30 P. M. SESSION.

200 Andes.....	15c	700 Mexican.....	1.25
50 Bullion.....	26c	200 Ophir.....	2.35
310 Best & Belcher.....	1.20	200.....	2.30
150 Crown Point.....	35c	100 Fremont.....	10c
200 C. O. & Va.....	2.35	150 Potosi.....	72c
250.....	2.30	300 Sierra Nevada.....	92c
100 Chollar.....	20c	50 Savage.....	28c
200 G & O.....	55c	100 S. Belcher.....	12c
50 H & N.....	44c	50 Union.....	66c

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR THE WEEK ENDING MARCH 20, 1894.

516,657.—TRUCK—M. O. Bailey, San Jose, Cal.	516,999.—COMPOSITE MATERIAL—Carter & Hinman, Los Angeles, Cal.
516,730.—TIMBER PRESERVING APPARATUS—Curtis & Isaac, S. F.	516,700.—DENTAL VULCANIZER—C. A. Davis, Pasadena, Cal.
516,931.—SPRAY NOZZLE—Chas. Hood, Puyallup, Wash.	516,936.—MOUTHPIECE—J. C. Ingram, S. F.
516,866.—ANTIROSTER—Henry Lahan, Traver, Cal.	517,013.—HORSESHOE—J. C. McCallum, Long Beach, Cal.
516,897.—HOOR—C. W. McMillan, Harleton, Cal.	516,743.—REVERSIBLE PLOW—W. W. Miller, Noyo, Cal.
516,727.—BALNO PRESS FEEDER—D. J. Overholzer, Spadra, Cal.	516,744.—CURLING IRON—T. F. Payne, Olympia, Wash.
516,911.—WATER MOTOR—W. H. Rucker, Hillsborough, Ugn.	516,670.—KNOB—Jacob Weather, Aberdeen, Wash.

NOTE.—Copies of U. S. and Foreign patents furnished by Dewey & Co. in the shortest time possible (by mail or telegraphic order). American and Foreign patents obtained, and general patent business for Pacific Coast Inventors transacted with perfect security, at reasonable rates, and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

SEPARATOR.—Robt. W. Jessup, Los Angeles, assignor of one-half to Fairfax H. Wheeler, Santa Barbara, Cal. No. 516,440. Dated March 13, 1894. The object of this machine is to separate particles according to their difference in length and, incidentally, according to other differences which would, with certain particles, enable them to readily pass through a hole and with others would retard or prevent them from so doing. Though the machine is applicable to the separation of various materials,

it is to be specially applied to the separation of oats and barley from wheat. The device consists of a perforated disk rotating in a vertical plane or substantially such a plane, a feed device applied to and adapted to maintain a layer of material against the uprising side of said disk, and a suitable backing applied to the reverse side of the disk on its uprising semi-area. The wheat will enter and pass through the holes of the disk, but the barley and oats will not.

BALING PRESS FEEDER.—No. 516,727. Dated March 20, 1894. David J. Overholzer, Spadra, Cal. This invention relates to an apparatus which is designed to feed hay or other material to a horizontal press in which the follower is adapted to reciprocate so as to compress the material into a bale. It consists of a hopper with swinging plates and arms and connections by which they are actuated so that the feed board forms one side of the hopper when open, and is actuated by the mechanism to force the charge into the press in front of the follower.

MOUTH-PIECE FOR MUSICAL WIND INSTRUMENTS.—No. 516,938. Joseph C. Ingram, San Francisco. The object of this invention is to provide a mouth-piece for wind instruments, having such a construction as will assist to hold the lips in proper position to produce the requisite tone. In the ordinary mouth-piece the performer must depend upon the muscular contraction of the lips and the pressure of the mouth-piece against them to hold them in proper position to produce the tone, and after a time the lips are apt to slip upon the mouth-piece and spoil the tone. In this invention a raised rim or fillet is formed upon the flat surface of the mouth-piece which serves the purpose.

TIMBER PRESERVING APPARATUS.—No. 516,730. Wm. G. Curtis and John D. Isaacs, San Francisco.

This invention provides a portable plant which is especially serviceable for use upon lines of railway. It consists of retort sections, each mounted upon railway trucks so as to be moved independently from place to place, and means for uniting the sections into lengths sufficient to hold the timber to be treated up to any desired length. Upon another car or cars are mounted a steam boiler, tanks containing the preservative compound with pumps and means for applying the compound after the moisture has first been driven from the timber. Within the retorts are cradles mounted upon trucks adapted to properly contain the timber and steam pipes with manifolds or steam chests and adjusting devices to compensate for expansion and contraction.

REVERSIBLE PLOW.—Wm. W. Miller of Noyo, Cal. No. 516,743. Dated March 20, 1894. This plow has a double mold board mounted upon a horizontal axis, adapting it to be turned through an arc in a vertical plane to fit a stationary land-side at either limit of its movement. The plow bottom is laterally concaved, and it has duplicate opposing share extremities. The object in view is to provide a plow not only adapted for use on side hills, but equally applicable for use on level ground, it being capable of perfect use in either or both situations.

Assessment Notices.

SUPERIOR MILL AND MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Placerville, El Dorado County, California.

Notice is hereby given that at a meeting of the Board of Directors held on the 13th day of March, 1894, an assessment (No. 1) of Twenty Cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary at the office of the company, Room 17, 313 Pine Street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 23d day of April, 1894, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 14th day of May, 1894, to pay the delinquent assessment, together with the cost of advertising and expenses of sale. By order of the Board of Directors.

R. W. HEATH, Secretary.

Office, 316 Pine St., Room 17, San Francisco, California.

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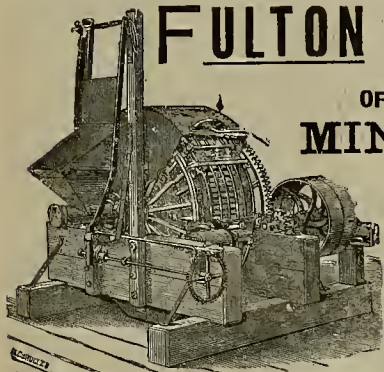
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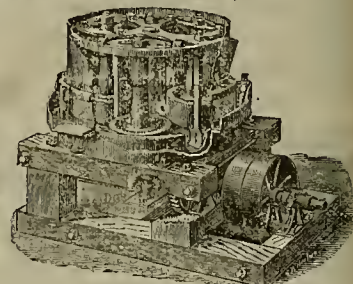
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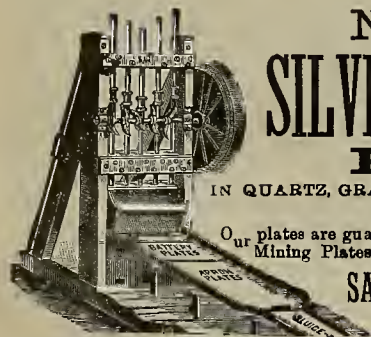
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MINING AND SCIENTIFIC PRESS.

An Illustrated Journal of Mining, Mechanics and Popular Science.

VOLUME LXVIII
Number 14.

SAN FRANCISCO, SATURDAY, APRIL 7, 1894.

Three Dollars per Annum.
SINGLE COPIES, 10 CENTS.

Two Kinds of Stamp Mills.

Mining literature has recently found considerable additions in a discussion as to the relative merits of Colorado stamp mills and California stamp mills. The Press has given space to the discussion, which has been both interesting and profitable; and the conclusion reached seems to have been that the California mill is best for California and that the Colorado mill is doubtless all right for Colorado. The essential difference between the two mills is that in one there is a fast and low drop, in the other a high and slow drop. In other words, the Colorado stamps

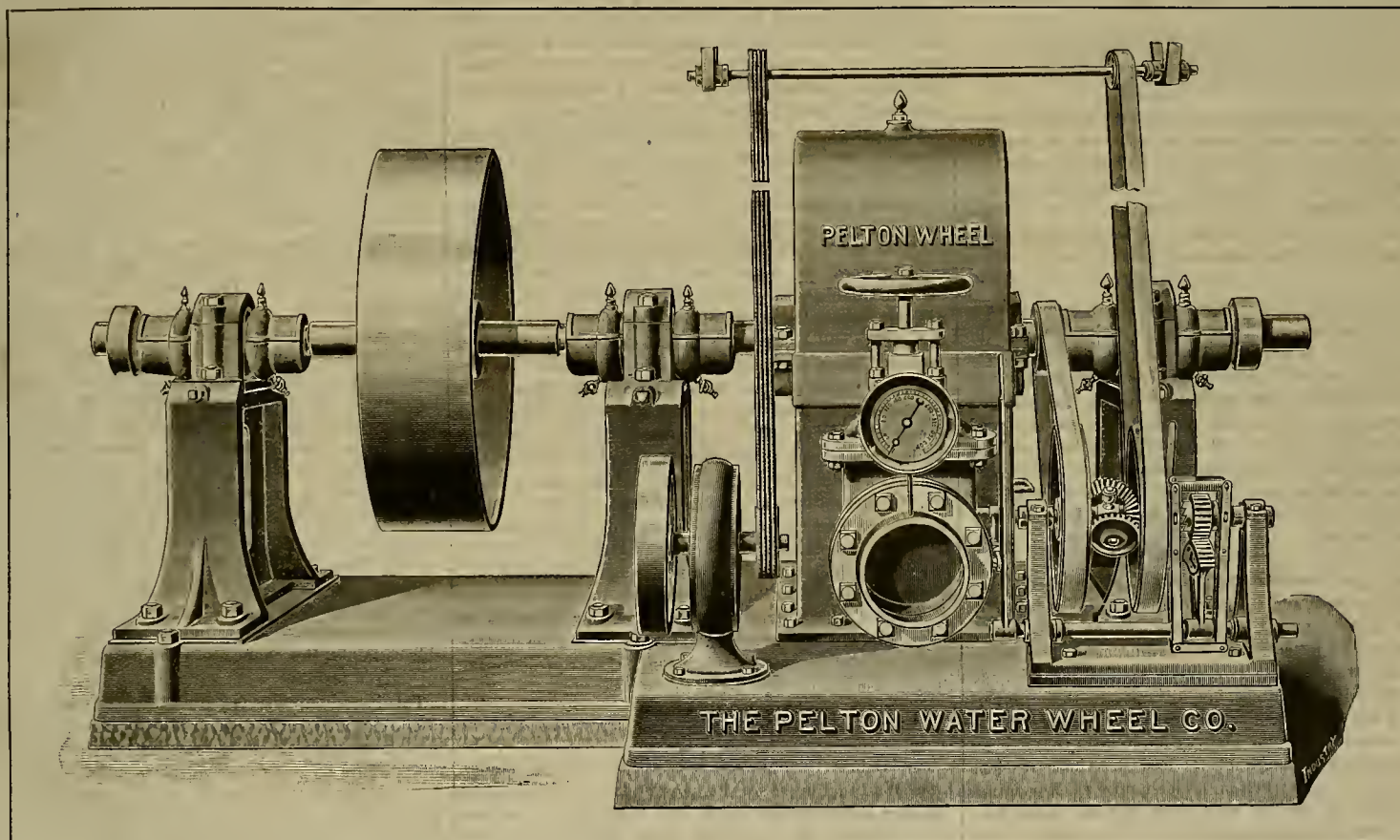
concentrator used is what is known as the "Gilpin county" bumping tables. Even the rock-breakers and the automatic feeders are different. Everything is different, and yet we are told that at one 94 per cent of the gold is saved with the concentrator; in the other, 89 per cent without. When the concentrator is running in the latter, the percentage, it is thought, will be brought up to 95.

This experience seems to prove that, in one instance at least, there is no room for controversy as to the values of the mills. Both are good.

Two hydraulic mining companies which had projected

The Pelton Water Wheel.

The illustration here presented shows a Pelton wheel equipment, mounted on a cast iron base with iron housing, including a differential governor, operated by a constant speed motor. The hearings are fitted with ring-oiling boxes, and the work throughout fully up to the highest standard for this or any other class of machinery. While these wheels are usually mounted on timber frames, and answer well in this way for all ordinary purposes, the design here presented is very desirable for running electric plants, and other installations of a permanent character.



STANDARD WATER WHEEL, FROM 50 TO 500 H. P.

drop (roughly speaking) twice as far and half as fast as the California.

In this connection, the experience of the two ten-stamp mills at Vanderhilt, in this State, is both curious and interesting. These mills, it is well known, have just been placed in operation. It had been predicted that the mills would not be successful, inasmuch as the ore is variable and of an unusual character. The gangue is quartz, honeycombed at the surface from the oxidation of sulphurets it originally contained, small disseminated crystals of which (iron, lead and copper) begin to show in the rock from the deepest part of the workings. Some of the rock contains a high percentage of lead in the form of galena and carbonate, but it occurs in hunches and is not evenly distributed through the rock. The Campbell mine has a Fraser & Chalmers mill, with 750-pound stamps, that drop seven inches 90 times per minute, and it has an Evans concentrator. The Vanderbilt Mining and Milling Company has a "Gilpin county" mill, with 650-pound stamps that drop 16 inches 30 times per minute, and the

and were carrying out large works in Plumas county, and which had obtained the necessary permission from the Debris Commission, have encountered an unexpected obstacle. Five farmers owning land adjoining a creek, within the tributaries of which it is proposed to deposit debris, have filed formal protest with the Debris Commission, and have likewise served notices upon the companies that they will take legal steps, if necessary, to prevent mining. The folly of all this is unspeakable. The riparian owners have no ground of complaint, or even apprehension of injury. There are four substantial dams in the stream, the plans of which have been pronounced adequate and secure by the Debris Commission, who are competent judges. It appears, further, that two of these farmers had already granted rights of way through their premises, and a third has since withdrawn his name from the remonstrance, leaving but two in a consistent position for objection. The companies state that they will pay "blood money" to no one. Perhaps, when the position of the companies is better understood, the objections will vanish.

The Pelton wheel—it is well known—is now almost exclusively used for every variety of service where the conditions permit as to head. It is especially adapted to running electrical machinery, from the perfect regulation afforded as also from the facility with which provision can be made for all the varying conditions of service as to speed, power, etc.

A wheel plant similar to that here shown has recently been furnished the Amador Light & Power Company at Sutter Creek, and another is under construction for the State Trade School at Ione.

COLONEL GEORGE H. MENDELL, Corps of Engineers; Lieutenant-Colonel William H. H. Benyard, Corps of Engineers, and Major William H. Heuer, Corps of Engineers, have been reappointed members of the California Debris Commission.

REPRESENTATIVE COFFEEN has introduced in Congress a bill for the free and unlimited coinage of silver dollars of 412½ grains.

MINING AND SCIENTIFIC PRESS.

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Our latest forms go to press on Thursday evening.

Entered at the S. F. Postoffice as Second-Class Mail Matter.

San Francisco, April 7, 1894.

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It is a curious fact that almost the only present disturbances in the labor world should be in the mining regions; and it is remarkable, also, that the feeling in each of the strikes should be so intensified as to reach the point of personal violence. At Cripple Creek, at Kreles, Colgate and Lehigh (Indian Territory), and in the Pennsylvania coke regions, there has been much trouble, and the end is not yet.

THE Boston & Montana Mining Company seems to have had a prosperous year during 1892, notwithstanding the great depression in copper. The directors say their works have more than met expectations. Especially is this the case with regard to the electrolytic plant, the production of which is a great deal larger than it was supposed to be capable of, and they still feel that they have not yet reached the limit of its productiveness, nor the still further reduction of cost of operation in all departments of the whole plant. The books show a balance, December 31, 1893, of \$350,000.

THE Cripple Creek mining troubles seem as far from settlement as ever, and it is doubtful when this noted camp will be able to resume operations. Since the Cripple Creek miners rejected a recent compromise, the mine-owners declare that they will make no further effort to meet unions or committees, but will operate their properties with non-union men or not at all. The situation is indeed unfortunate. So many compromises have been proposed that it is remarkable no basis has been reached upon which there can be an understanding. The mine-owners and the miners have both receded from their original demands, but they are no closer together. Just how near they were to agreement will be seen when it is stated that the mine-owners offered \$2.62½ for seven and one-half hours' actual work; the miners wanted \$2.75 for the same time.

THE veto of the seigniorage bill is not to be regarded as an unmixed calamity. It was at best only a makeshift, designed to relieve the present pressure on silver, and to open the way for better prices. But it committed the Government to no definite policy, and the situation would have been no better one or two years in future than now. What is needed is a change in the fundamental policy of the Government. The veto, we think, emphasizes the position of the Administration against silver and serves notice upon the world at large that any sort of relief from that source is not to be hoped for. It is well enough to know this, even if it costs something; and the knowledge will undoubtedly increase the activity of the friends of bimetallism and strengthen their hands. It is necessary sometimes to cut off a limb to save a life, and the severe object-lesson the evils of restricted circulation and monetary disorder, which has been afforded the world by the recent hard times, are not without their benefits.

Ownership of Mines.

Mr. Albert Williams, Jr., in the *Engineering Magazine* of April, makes a recent article in the PRESS the basis of a discussion of the patent system of ownership of mining claims. The objects of the present law he very clearly states in the following:

It has been the aim of the law-makers in the United States and the Spanish-American countries to accomplish two results—to encourage the active development of the mineral resources and at the same time to secure owners in their holding. To gain these two things laws have been framed whose provisions are in a measure antagonistic. First, to compel the claims to be worked, there is the assessment-work plan (temporarily suspended in the United States), which requires the owner to do a certain amount of work each year upon his claim, the penalty being forfeiture of title and liability to having the claim "jumped" by any one who considers it worth taking up, and, in the early rough-and-tumble days, who was strong enough to hold possession. Then there is the patent system, intended to firmly secure title to owners who have gone through certain forms of locating, having official surveys made by government deputy surveyors, advertising intention, paying certain fees and doing certain work; after which, a patent having been issued through the land office, the theory is that the title is safe in perpetuity.

It cannot be disputed that both systems have their weak points. It is well known in the West that the assessment-work requirement for unpatented claims is subject to great abuses. In the nature of things, what constitutes \$100 worth of work on claims, all of which present a great variety of conditions, it is not possible to determine definitely; and consequently it is practically not determined at all, but is a matter left largely, if not wholly, to the inclination and conscience of the miner, or to his apprehension that his claim will be "jumped" if a showing of work is not made. All are agreed that the present law is inefficient and unsatisfactory, but all are not agreed as to what is the proper remedy. Indeed, there appears to be no general disposition among mining men to secure any kind of improvement, but to let well enough (or bad enough) alone. It is likely that if some plan, proposing a change and having features which appeal strongly to the fairness and justice of miners, were proposed, it would be seriously advocated by them, and might lead to reform.

The patent system is not subject to the same criticism, though it has its objectionable points, some of them growing out of the assessment plan. The essential difficulty is to devise a system of ownership which shall secure absolute title to property that is in one sense invisible, intangible, and not absolutely definable by metes and bounds; in other words, to property *out of sight*. We are not sure that the trouble with present titles lies with the patent system; it is with the nature of the property. The trouble is, and always will be, that the nature, extent and direction of quartz ledges are not ascertainable at the time it is first desired to secure absolute possession; and, therefore, under any system, conflicts, disputes and suits at law are bound to ensue. It may well be admitted that the present mining laws are intricate, burdensome, vexatious and contradictory, and are in need of material amendment; worse yet, the present laws are not interpreted in their proper spirit by at least one important branch of the government service, and there is sad need of a new code which will not only define the rights of one miner as against another, but as against all the world. But there is danger that any proposition which involves a change of the principle of ownership will be retroactive, and should not be undertaken without serious consideration. Under present conditions it might do more harm than good.

The Spy System.

The Debris Commission is awaiting for instructions from Washington as to its powers for punishment of offenders under the Caminetti act. It seems to have been clearly intended by the framers of the law that the entire control of hydraulic mining should be vested in the Commission, as witness the following sentence from section 19:

Said Commission shall take necessary steps to enforce its orders in case of the neglect, failure or refusal of such owner or owners to comply therewith, or in the event of any person or persons, company or corporation, working by said process in said territory contrary to law.

There ought to be no question what the above means; but it is very natural, under the circumstances, that the Commission should hesitate to undertake the duties and authority of police officers. It would involve the employment of an added force, which it has no funds to employ, even if it has the power, and it means an increase in the Commission's labor which it is not now able to perform.

There are doubtless other reasons why the Commission is reluctant to undertake the punishment of malefactors. For years the Anti-Debris Association has maintained a system of espionage over hydraulic mining that has brought discredit upon them. They hired spies and informers who, for hope of reward, patrolled the mining regions and endeavored to "catch in the act" any who were engaged in illegal mining. It is a singular fact that, despite the elaborate detective system of the anti-debris advocates, the total number of arrests during a long series

of years did not reach fifteen; but it was kept up all the same, at large expense. The Anti-Debris Association has by no means considered that it was pursuing its aims by the most laudable and desirable methods; but it has declared, substantially, that the end justified the means, and these means were all that were practicable. The spy system has been the direct source of very much of the hostile feeling that long existed between the farmers and miners. No wonder the Debris Commission is loath to engage in a work inaugurated and maintained under such auspices, and which is certain to engender more trouble in future if not dropped.

California Mines at the Midwinter Fair.

Placer County.—The exhibit of Placer county is distinctive. In its main features it is altogether different from other counties, and for that reason attracts at least as much attention as any other. Placer county is the home of drift mining. Within its borders this interesting branch of the industry has reached its highest and most extensive development; and it is here also that those intricate geologic problems which have confronted the engineer who has attempted to locate the lava-capped auriferous channels have been met and solved. Drift mining is *sui generis*. Its successful pursuit requires a peculiar experience, or, rather, an adaptation of general engineering and mining experience in a new direction. The pioneers in drift mining made Placer county the scene of their operations. The early miners soon discovered that the richest gold-bearing gravels lay immediately on the country rock and followed it into the mountain side. Being then unable to remove the great masses of barren earth and nearly barren gravel overlying, the rich gold-bearing portion of the latter was followed by tunnels, broken out by methods of underground mining, brought to the surface and there washed for gold. Subsequently it was discovered that auriferous gravels also underlay some of the gravels and volcanic wash. These deposits, being those exposed on the benches and slopes of the lava-capped mountains, were followed by tunnels and mined, and finally, inferentially, the existence of auriferous gravel under the lava, where there were no surface indications, was assumed, and tunnels were run into the side of the mountain to locate and mine it. As early as 1853 the mining of the deep-buried auriferous placers through tunnels, and in a manner analogous to coal mining, was commenced. This branch of gold mining soon became known as "drift mining," and was so distinguished from hydraulic, river or bar mining. No statistics have ever been kept showing the amount of gold obtained respectively from drift, hydraulic and surface mining, the latter including river beds, but Russell M. Dunn, M. E., an authority, considers it probable that, in the aggregate, from the discovery of gold to the present time, the yield from drift mining is close on to that from surface mining and somewhat in excess of that from hydraulic mining—an estimate that will surprise many who have not followed closely the history of the various branches of the industry in this State. In its early history drift mining was a succession of expensive failures and brilliant successes; now the chances of failure are reduced to a minimum, and it is possible to determine in advance, with reasonable certainty, the chances of opening up a pay channel in a given instance.

This introduction serves to indicate the essential feature of mining in Placer county; and it is to be expected that, in making an exhibit of its mineral resources, the drift mines would be given a conspicuous place. The purpose of the collectors of the exhibit has been well carried out. The display as a whole is unique, tasteful and instructive. The exhibit occupies a space about 17x21 feet, and at each end are placed prominently large square glass cases, containing characteristic gravel from the Sunny South (Hidden Treasure), Red Point, Mayflower and Doolittle mines, respectively. In the center is a pyramid of quartz from the working mines of the county, surmounting which is a fifth case, containing gravel from the Morning Star drift mine. Within the gravel is distributed quantities of drift gold, designed to illustrate the manner in which it occurs in the channels; and surrounding the base are collected quantities of howlers, petrifications, gravel and debris, showing the average composition of the channels, as well as the volcanic capping. It is interesting to note that the characteristic howlers from two mines are quartz, while those from two others are the plain striped. One oak petrification is worthy of note. It weighs about 20 pounds and has preserved the oak formation in an unusually perfect form. This petrification is said to be worth about \$200. It is from the Doolittle mine. One howler from Col. Doolittle's mine is covered with sulphurets.

Next in importance—and by many considered first in interest—is the fine collection of drift, quartz and placer gold shown in the cases in a prominent place. The specimens have been arranged with a view to catch the

casual glance, and they are indeed most beautiful. The rarest specimen is perhaps a fine piece of leaf gold from the cabinet of Mrs. M. H. Dodge, Forest Hill, worth \$100. Mrs. Dodge also shows a nugget worth \$180, the most valuable single piece in the collection. Two cases of great value are from the Hidden Treasure mine, showing drift gold, the largest piece of which is worth \$110. The Morning Star mine, owned by Hon. Jacob Neff, displays a fine variety of drift gold, collected in the significant form of a star. One case of specimens from the Drummond quartz mine is shown by Charles T. Reed. The specimens are fairly brilliant with leaf gold, the case being worth \$1000. The celebrated Mayflower mine shows three cases of gold of very fine character and great value. Altogether the value of this part of Placer's display is worth \$12,000, and it is one of the most attractive features of the entire mineral exhibit.

Placer county has its quartz as well as its drift and other mines. There is a fine collection from the Boulder mine, in the Opbir district, which shows also pieces of crystallized quartz of great beauty. The quartz specimens from the Boulder mine are typical of the mines of the county, which are of value and whose development has been considerable.

The Rocklin granite quarry has a display of its product, showing its character and suitability for building and ornamental purposes. From the Lincoln pottery of Gladding, McBean & Co. is a showing of its product, which includes sewer and chimney pipe, and all kinds of terra cotta goods, with fire brick and drain tiling.

The display that best illustrates the great variety of the mineral resources of Placer is the large exhibit of specimens, in three cases, of Alex. Keller, Auburn. They number about 500 specimens and are of great diversity and beauty.

Col. J. E. Doolittle shows a model of sluice box, grizzly and undercurrent used in hydraulic mining.

Several curiosities are shown, among them a granite mortar found 150 feet below the surface in a hydraulic mine at Dutch Flat. It was evidently ground out and used by a prehistoric people. A big striped boulder, with perfect stratifications, from the Red Point mine, attracts a great deal of attention.

The exhibit is in charge of Felix Chappellet Jr., who is courteous to visitors and well informed as to the resources of the county.

A summary of the exhibit is as follows:

Gold-bearing quartz and gravel from the Dore and Pioneer mines, the Osborn ledge and the New England mills; gold-bearing gravel from the White Quartz channel; pig iron from the Keller mine; gold-bearing cement from the Mayflower mine; gold-bearing gravel from the Hidden Treasure mine, and also from the Red Point, Mayflower and the Doolittle and Gould mines; gold-bearing quartz from the Drummond mine; nuggets from the Hidden Treasure, Morning Star, Power & Doolittle and Red Point mines; pottery from the works at Lincoln; granite from the Rocklin quarries; chrome iron from the New England mills; specimens of rim sand, petrified wood, striped boulder and an imitation gold brick representing the famous Harqua Hala bonanza (Arizona), weighing 5527.87 ounces and valued at \$96,237.27; Alexander Keller's collection, containing specimens of cabed rock, branded sandstone, brown jasper, volcanic marble, eupholite, airome, jasper rock, aloritic trachyte, cornelian agate, ring stone, serpentine porcelain, onyx, calcite, epidote on quartz, wall rock, mica, gold-bearing cement, quartz agate, pierolite and copper, manganese on quartz, magnetic iron, malachite, radiated calcite, fossil buckeye wood, andesite, ammonite, alphabetic porphyry, bent slate, glacial stones, baryte in wood fossil, carbonate of copper, gastoldite, blue quartz, red tourmaline, pottery clay, tremolite, banded slate, linerite, purple marble, rhodonite, wulgenite, fossil acorn, iron slag, pepperites, molybdenite, honey stone, iron sulphurets, mariposite, arsenical pyrites, tuzza, orthoclase, graphic granite, dogtooth spar, limonite, brocciated diabase and brown hematite.

Santa Clara.—The mineral exhibit of this county is wholly confined to a display from the famous New Almaden quicksilver mine. The exhibit is simple, but of value. It consists of a pyramid of cinnabar ore, from some of which the pure quicksilver can be obtained by hand, and of photographs of the various workings of these mines. The photographic display is, indeed, a very important and interesting feature. It shows not only the mines, including the surface and underground workings, but it presents a variety of views of the town, streets, houses and amusement places, showing finely the manner of daily life of the miners—their work and their play. One view, marked "An unusual occurrence," shows the town covered with snow—indeed, an unusual occurrence in low altitudes in this State. A large number of quicksilver flasks marked with the familiar "A" are shown. It is intended to place a quantity of quicksilver in a receptacle already prepared for the purpose and deposit cannon balls therein, giving a unique illustration of the high specific gravity of the quicksilver, for of course the balls will float.

AL. WEST, foreman of the Rosedale gravel mine, Tnolmme county, had one of his legs badly crushed just above the ankle, at about 4 o'clock on Thursday afternoon of last week. He and his partner were the only ones working in the mine at the time of the accident. Mr. West was in a squatting position and picking dirt from the top of a drift, when about two tons of material that became loosened fell, with the above result.

Slackens.

THREE mining claims in Humboldt district, A. T., have been sold for \$300,000 to St. Louis capitalists.

FROM West Kootenay, for 1893, there were shipped 246,869 ounces of silver and 2,072,370 pounds of lead.

AFTER a month's suspension for the placing of new boilers, the Virtue mine, in Baker county, has started up again.

A YOUNG man in one of the mining counties recently purchased quartz crystals from a swindler who called them diamonds.

THE *Record* says that Pioche, Nev., a town of over 1000 inhabitants, has no religious services of any kind, not even a Sunday school.

MR. TAYLOR D. MACLEON, the mining man, has gone to Arizona, where he has large interests. His address for several months will be at Yuma.

THE Omaha & Grant smelting pool has invited the Utah smelters to join the combination, and the miners of Utah are up in arms against the proposition.

J. L. DOWNING and R. L. Weaver, who left Cottage Grove, Lane county, Or., March 15th for the Bozeman mine are supposed to have perished in the mountains.

THE Homestake mine, in the Neal district, Eastern Oregon, has been sold to Denver capitalists interested in the Omaha & Grant Company. The consideration is \$60,000.

THE Nigger Ben mine, which has been "lost" for 30 years, its owner, a colored man, having been killed by Indians, has been rediscovered. It is in the Harqua Halas, in Arizona.

THE body of Henry Kreiner, a miner, well known in mining camps in southern California, was found on the Mojave desert. Kreiner had fallen from his wagon, and in the fall killed himself.

At a wedding in Camas Valley, Or., recently a duck was served whose craw was found to contain 25 cents worth of gold. The gravel bank frequented by the ducks will be prospected.

GOVANOS MCCONNELL has investigated the charges against Mine Inspector W. S. Haskins, in connection with the recent Bunker Hill and Sullivan accident, and declares them unfounded.

TAKING advantage of the low water in the Fraser and Thompson rivers in the bar below Government heads, British Columbia, a large number of Indians are said to be taking out \$6 a day each with rockers.

D. S. K. BUICK has sold the "Steam Beer" mine, near Leland, Josephine county, owned by J. C. Fullerton and John Rast, of Baker City. The purchaser is Elvin Nicodemus, of Chicago, and the consideration \$6000.

THE White Swan mine, Baker county, has been sold—consideration, \$125,000—and the purchasers are composed of a syndicate of Chicago capitalists, with headquarters at Baker City, and F. M. Johnson is the authorized agent.

W. H. CLARY of the Sheep Ranch mine warns prospectors to keep away from Calaveras county. The placers are worked out or all taken up, and it takes money to open up a prospect. He would do much better in the "pocket" counties of Tuolumne or Mariposa.

THE Boa Mining and Milling Company has been incorporated. Principal place of business, San Francisco. Capital stock, \$1,000,000, with R. H. Daly and T. M. Ferguson of San Francisco and I. L. Givens, H. T. Bradley and John T. Bradley of Oakland as directors.

DEEDS have been filed for record for the transfer of three mining claims in the Humboldt district, Ariz., the purchase price being \$300,000. The purchasers are St. Louis capitalists. Two or three other sales of gold properties have been consummated during the past week, the prices ranging from \$40,000 to \$250,000.

PLACER miners about Spokane will be interested in an effort being made to organize an association, somewhat on the plan of the Mining Exchange, for their especial benefit. It will have a double object: the dissemination of knowledge of modes of operating placers and their location in the northwest, and the advantageous sale and exchange of new discoveries.

LABOR COMMISSIONER MILLS' REPORT gives the following list of wages paid in Montana, the amount being per diem: Quartz miners, \$3.50; quartz-mill men, \$3.48; smelter men, \$2.88; coal miners, \$3.24; stationary engineers, \$3.78; stationary firemen, \$3.25; carpenters, millwrights, etc., \$4.18; bricklayers and stone masons, \$5.55; granite and stone cutters, \$4.92; painters and decorators, \$3.79; machinists, \$3.72; boilermakers, \$3.91; foundry employes, \$4.18.

THE Weber Mining and Milling Company, of Lakeview, Kootenai county, Idaho, has filed articles of incorporation. The object of the company is to construct and operate a quartz mill, reduction works and a power plant to operate the Weber group of mines in the Pend d'Oreille district. The capital stock is \$500,000, of which \$200,000 is subscribed. The incorporators are George A. Sheley, J. C. Dickinson of Detroit, F. A. Weber and S. P. Donnelly of Lakeview, and H. M. Casey of Hope.

THE Astronomical Society of the Pacific Coast held its annual meeting last week and elected the following officers for the ensuing year: W. W. Campbell, president; W. J. Hussey, first vice-president; William M. Pierson, second vice-president; John Dobbeier, third vice-president; C. D. Perrine, secretary at Mount Hamilton; F. R. Ziel, secretary and treasurer at San Francisco. The above officers and William Alford, E. S. Holden, E. J. Molera, J. M. Schaeberle and O. Von Geldern were chosen directors.

ASHLAND, Or., is preparing for a grand celebration in honor of mining developments. The programme includes a banquet to the miners at the Hotel Oregon and a free ball at the Opera House in the evening. The immediate cause of the celebration is the striking of a ledge by the Ashland Mining Company at its mine near town, which is taken as complete evidence of the permanency of the mining industry in that section. The company has been steadily at work since last fall boring a tunnel which has just completed tapping the ledge at a depth of 600

feet from the surface. The walls of the ledge are 30 feet apart, with an 8-foot body of quartz. The people have awaited with great interest the outcome of this work and Ashland is jubilant over the result. No other mine in Oregon has been prospected to an equal extent.

COL. C. C. THOMAS, the retiring superintendent of the Comstock Tunnel Company, was tendered a reception at Sontro on March 31st. A large delegation of the Colonel's friends was in attendance from Virginia, Dayton, Silver City, Empire and adjacent towns. During the evening Mr. H. V. Clinton, in a few well-chosen remarks, presented Colonel Thomas with an elegant watch chain and locket, the gift of the employees of the Comstock Tunnel Company, many of whom have been in the employ of Colonel Thomas continuously for over 14 years.

THE executive committee of the River Improvement Convention met at Sacramento and received the report of the delegation sent to Washington some months ago to work for an adequate appropriation for the improvement of the Sacramento, San Joaquin and Feather rivers. The members of the delegation gave personal recitals of their visit to the capital and of their exertions with members of Congress and the Government officials. The delegation secured a hearing before the House Committee on Rivers and Harbors, and had interviews with various members of the House.

JAMES F. WAANNEA, who has just come back from South Africa, has many interesting things to say of Californians now on the Rand. He says: "The California and Nevada men there—and there are hosts of them—are all doing well. John Hays Hammond heads the list. He is getting a salary of \$30,000 a year as consulting engineer for the Rhodes-Barnatto group. V. M. Clement, who was formerly at Grass Valley, is receiving \$1500 a month as superintendent of one of these mines. Captain Maine, formerly superintendent of the Treadwell mine in Alaska, is another Californian there who is doing well. Mr. Webber, who was prominently connected with different mines here, is now general manager of the celebrated Crown Wreath mine at Johannesburg. J. P. Connor is superintendent of the construction of machinery for the Rhodes-Barnatto mines. Perkins, who constructed the Tacoma smelter, is superintendent of the Guildenhans, or Golden Horse mine. Clanton is engineer of the City and Suburban mine."

Gaminetti as a Friend of Silver.

Representative Gaminetti of California has introduced in Congress a joint resolution authorizing the President to invite all of the nations of the Western hemisphere to a conference on the financial question. The preamble of the resolution recites the fact of the community of interests existing in the Western hemisphere, the continued depreciation of silver, the default by Guatemala, that Mexico and the Governments in Central and South America may take similar action, and asserts that the various interests of the United States are threatened with loss. Then follows the resolution. By it the President is requested to invite representatives of American republics to meet in Washington, whose object it shall be "to obtain relief from the conditions which have caused the demonetization of silver."

The second part is as follows: "The convention shall be for the purpose of drafting a treaty or treaties on the subject, to be thereafter submitted for verification to the several nations represented, calculated to secure to them such recognition of silver from the nations of the Eastern hemisphere and to provide regulations governing the production thereof and maintenance among themselves of such a standard as will restore permanent financial conditions and protect their common interests."

Reports received from various sources in Washington show that the depreciation in silver is being seriously considered in many quarters of the globe, and that the general discussion of proposed legislation in favor of the white metal is on the increase in several widely-scattered capitals.

The London Chamber of Commerce has submitted a memorial to the British Government praying for an international inquiry into the causes of the decline and fluctuation of the value of silver, and for relief from the embarrassment and losses suffered therefrom by British merchants doing business with the countries where silver is the common currency and standard of value.

Recently the Minister of Guatemala in London, under instructions from his Government, announced that the interest upon its bonded debt would have to be passed, on account of the low price of silver and the high rate of exchange. The Guatemala dollar, which had been worth from 75 to 79 cents, has dropped to 38 and 41 cents, and as the revenues of the republic are received in silver the interest on the bonds is practically doubled and the Government is made to pay 8 per cent interest instead of 4 per cent per annum. The bonds, which have been quoted from 55 to 60, dropped to 30 when the news was known.

Englishmen, who have an association of American bondholders in London, cabled their remonstrance to Guatemala and caused an investigation. They now claim that they have evidence to justify them in the opinion that the default of Guatemala is not due to any inability to meet her financial obligations, but is to punish England for her opposition to bimetalism and her responsibility for the decline in the value of silver by suspending silver coinage in India. The bondholders have asked the Government to intervene and enforce the payment of the interest when

due, and this is a question Lord Roseberry will have to meet.

Guatemala has entered no denial, nor is it thought that her Government desires to conceal the motive of her policy. Her justification will be that, by reason of the policy of Great Britain, the national currency of Guatemala is deprived of one-half its value and its obligations are thereby doubled. The subjects of the nation that is responsible for the situation must suffer. Great Britain may send down men-of-war to collect the interest on the debt for her bondholders, as they will doubtless request, but if she attempts force she will have to blockade every harbor south of the Gulf of Mexico and the Rio Grande, for the example of Guatemala is likely to be followed by most, if not all, of the Latin-American countries.

Similar action may be expected on the part of the Argentine Republic. Telegrams from Buenos Ayres contain unmistakable evidence that the action of Guatemala is approved.

Mr. Caminetti believes that by uniting all the American republics in one firm silver policy, great force can be exerted in favor of silver. It is thought the resolution will be adopted.

The Cœur d'Alene Snowslides.

The miners of the Cœur d'Alene region are suffering under an accumulation of misfortunes. The strike of two years ago and the recent enormous depression in lead and silver values had all but paralyzed the mining industry, but it had recently shown signs of reviving life and several of its important mines had resumed operations. Now another heavy misfortune is added to their already heavy burden. Tremendous snowslides have done much damage to property and caused loss of life and cessation of operations in several mines. The accident is so appalling and extraordinary that the circumstances will bear narration:

The snow had accumulated on the mountains at Canyon creek to a depth of fully 60 feet, and the late rains caused the huge mass to move at several places.

At an early hour March 29th a section of snow 300 feet in length, near the Black Bear mine, became detached and started down the steep mountain side. Before the inhabitants of the cabins in the path of the slide could flee the avalanche was upon them. Trees were torn up by the roots and boulders carried along by the mighty force; the whole shaking of the earth was as if an earthquake was in progress. Two families, together with their homes, were caught and carried along with the slide and buried out of sight at the bottom of the canyon. Others unaccounted for are also believed to have been killed.

Soon after the first slide took place another avalanche occurred farther up the canyon, near Burke. A family named Cbilson, consisting of father, mother and three children, heard the avalanche coming. Picking up the children, the frantic parents attempted to flee to a place of safety, but before they had gone 50 yards they were overtaken by the resistless mass of snow and crushed to death.

The snow is 40 feet deep and almost as solid as ice. The Gem, Frisco and Poorman mines turned out their whole force of miners to work for the recovery of the bodies.

Within a mile and a half above Gem are three other slides, one of them covering both railroads to a depth of considerable over 100 feet.

Some of the slides have been very destructive to flumes and railroad property, but the full damage will not be known before many days.

About 4 P. M., March 29th, a slide came down between Wallace and Gem, cutting off communication. Another one in Placer creek carried away a part of the electric light company's flume and light. Wallace is in darkness.

On March 30th the search party at the Black Bear snowslide worked all day without result, but just at dusk discovered the body of Martino Michele, an Italian miner who was stopping with the Deiro family. The bodies thus far found are: Mrs. Deiro, aged 25; Victoria Deiro, her daughter, aged 5; Mrs. Nellie Rowe, aged about 35; Martino Michele, aged 24. Other bodies have since been found. The total loss of life was about twelve.

All the buildings and furniture were literally smashed to atoms and were carried forward 20 to 40 feet in the direction of the slide.

The damage to business is serious. The railroads cannot be operated until the obstructions are removed, and some of the mines must shut down in consequence. The Standard has already done so. The Frisco flume has been carried away in four places, aggregating 1300 feet. This closes down that mine until the repairs can be made. The Union Pacific suffers much more than the Northern Pacific, as all the slides are on their side of the canyon. Burke depends mainly on the railroads for its wood supply. The Northern Pacific has brought over a snow plow and

commenced to remove the slides. The roads will surely be blocked for a week, and possibly much longer. The Poorman mine was to have started up April 1st. This will doubtless delay work there, and may close down the Tiger mine, as they have no room for storage of concentrates.

A New Chlorination Process.

A description of a new process of chlorination, invented by Mr. J. W. Sutton, of Brisbane, Australia, is thus given by *Industries and Iron*:

"The chlorination used in these trials consisted of a wrought-iron barrel lined with lead, through which passed axially a perforated tube lined with asbestos. Attached to this barrel was placed a smaller one, also lined with lead, and fitted with a steam jacket in such a manner that both barrels could be rotated by the same gearing at the rate of about five revolutions per minute. The damp ore is placed in the large barrel, and a charge of manganese dioxide, salt and sulphuric acid in the smaller one before commencing operations. In this way the ore as it is rotated in the larger barrel is saturated with chlorine as it issues from the central tube, and when the evolution of gas becomes slow the steam is turned on to the jacket, and thus ensures the complete decomposition of the salt. Valves in the barrels are opened at starting, so as to allow of the exit of the enclosed air, and guarantee a strong chlorine gas acting on the ore. Three hours' treatment has been found sufficient for the dissolution of the gold in the Mount Morgan ores, and at the end of this time the contents of the barrel are run into a leaching machine, which is a centrifugal similar to that used for drying sugar. This method of leaching is found to be most economical of water, and seven minutes only are required for leaching a charge of 10 to 20 cwt. of ore. At the end of the leaching operation a small mechanical plow removes the spent ore from the centrifugal into trucks or into shoots leading to the waste tailing heap. The gold is recovered from the solution in a precipitating tank of rectangular shape, through which a spindle is driven from corner to corner. Kerosene oil and sulphate of iron are added to the leachings in this tank, and the precipitation of the gold is completed in ten minutes. A tap in the precipitator is then opened, when the water and base metals run through a sand filter and the oil containing the gold in suspension passes into another small centrifugal, where the oil is immediately separated and ready for use over again, while the gold remains in the basket, from which it is scooped out and melted. Those of our readers acquainted with the Hall and Richards process, which hitherto has been in use at Mount Morgan, will see that the new process has many points of dissimilarity to it, and saves not only the bother attending the burning of the charcoal filters, but also marks a great improvement in the methods of leaching adopted in older processes. In addition, no amalgamation is necessary, as the gold separated from the oil is ready at once for the melting crucible, and the ore, unless it contains a large quantity of mundic, can be treated without any previous roasting, since the chlorine is delivered to the ore in an undiluted condition. The cost is stated to work out at 6s. per ton."

SENATOR WOLCOTT has introduced the following resolution in Congress: "That the President of the United States be requested to enter into negotiations with the Republic of Mexico, with a view to encourage and extend our commercial relations with China and other Asiatic countries, looking to the coinage at our mints of standard Mexican dollars, under proper agreement with Mexico as to the seigniorage, method and amount of coinage, and to report the result of his negotiations to the Senate." This resolution was agreed upon at a recent conference held at Senator Wolcott's house, in which Senators Dubois, Shoup, Teller and other Senators from the silver States participated, and it was then agreed that a resolution to this effect should be drafted and the issue raised as to whether the President and Congress would consent to enter into negotiations with Mexico looking to the coinage of Mexican silver dollars by our mints at San Francisco and Carson, and thus afford a market for the American silver product.

Foundry Notes.

THE Spring Valley Water Works will build a reservoir on top of Clarendon Heights, south of Golden Gate park, and on Saturday gave the contract for erecting the reservoir to the Union Iron Works. It was proposed to give this reservoir a capacity of from 350,000 to 500,000 gallons. The contract calls for a steel reservoir of the capacity of 500,000 gallons, and it will be placed at an elevation of 600 feet above. The site is a little less than two acres in extent, and this elevation insures water facilities for a large area of country at present unavailable for residences purposes. This plans for a pumping station are being prepared.

BAKER CITY is considering a proposition from an Eastern syndicate for this section of a smelter.

The Coxe Movement.

The Coxe movement is developing unexpected vitality. The original division, with Coxe and Carl Browne in command, has more than doubled its numbers in a week's march, and is now at Pittsburg. The other division, which left Los Angeles three weeks ago, and which, at the time of last week's report, was stranded in a Texan desert, has gotten as far as Arkansas and is gaining accessions to its ranks. Encouraged by this success, new companies are springing up all over the country. A second division, of 125 men, left Los Angeles on Monday, and a division 600 strong left San Francisco on Tuesday of this week. These several divisions expect to meet at Washington about May 1st, and it really looks as if they would make a crowd formidable in its numbers. Coxe declares that the army will camp before Washington 250,000 strong, while dispassionate judges admit that perhaps one-fourth of that number may get there.

As this curious army increases in numbers it improves in quality. The pioneers in the movement, both in California and Ohio, were mere tramps, but the recruits are of better character. A good number of respectable farm laborers and mechanics have joined Coxe; and of the company which left Los Angeles on Monday about twenty per cent were heads of families, and nearly all were of a respectable sort. The accessions to the first California detachment since it reached Texas are said to be superior to the original rank and file. At various points in the East, unemployed and striking mechanics are forming into companies and will join the forward march when the column reaches them. A very notable fact in connection with this strange movement is the reception accorded the "Commonwealers" by the public. In many places they are entertained as public guests, and everywhere they are liberally provided for. The novelty of the thing must largely account for this, but when reduced to the last analysis, there appears an element of sympathy for the movement in spite of its absurdity.

In a statement put forth by "General" Coxe we have a full explanation of the purposes of the "army." Coxe, it appears, is a man of some property, who believes that the prevailing hard times are due to contraction of the currency; and who further believes that no possible harm can come of an indefinite inflation of the currency. He wants a law authorizing every municipal corporation in the country to issue or receive paper money up to one-half of the value of the taxable property it contains. This money he proposes that the municipal authorities shall spend in the employment of labor upon public works. As only Congress can enact the laws necessary to carry out this scheme, he proposes that the unemployed shall march to Washington and demand relief. "A quarter of a million men clamoring for work," he says, "is a petition that cannot be thrown into the waste-basket."

Of course, the folly of all this is beyond words. The march to Washington is a crazy movement in support of a crazy scheme; and yet as we see in the incidents of the movement above outlined, it has a definite and increasing strength and commands a species of sympathy from the public. It is easy to denounce and to rail and to threaten, but it is better worth while to inquire into the sources of this strength and sympathy, and it appears not unlikely that they will be found to lie in the hardship and injustice of a financial system against which the Commonwealers are in an instinctive though grotesque revolt.

Fish Display at the Fair.

The next feature of the competitive-exhibit order at the Fair will be a display of the fish industry, from April 5th to 12th. Space has been provided for this exhibit in the arcade in front of the Agriculture and Horticulture Building. A number of tables will be placed there for the purpose, and the fish will be taken directly to the Exposition grounds and placed on ice on these tables.

It is proposed to make it one of the prominent features of the Fair, and the fish of all countries, as well as of the Pacific coast in general, will be shown. There will be fresh, smoked and salt fish. Few people realize the amount of capital involved in this industry on the Pacific coast. As is probably well known, salmon constitutes the chief branch of it, and last year over \$5,000,000 was expended in catching, packing and shipping this one variety. The total value of fish passing through San Francisco amounts to over \$6,000,000 annually. The codfish exhibit will not play a prominent part in the proposed competitive display, but will have special arrangements made for it later in the season, or at such a time when the condition of the fish will permit.

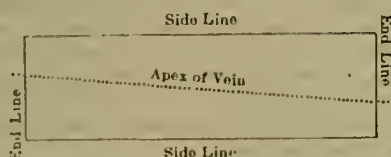
The Irrigation Movement.

Active preparations are now being made for the next National Irrigation Congress to be held about September 15th, at some point in the West not yet determined on. The last Congress, which was in session about a week in Los Angeles, October, 1893, appointed commissioners in every Western State and Territory, whose duty it is to prepare a report to be submitted to the coming Congress covering all the features of special interest in each State and Territory of the arid West. These reports will show the amount of arid and semi-arid land; the amount of land now irrigated, and the acreage believed to be irrigable; the sources of water supply, developed and possible of development; the cost of procuring, storing, and delivering water on lands; State legislation, in force and needed; national legislation as to the disposition of arid lands and Government control of water sources; and such other points as may suggest themselves to each commission as being pertinent to their own State.

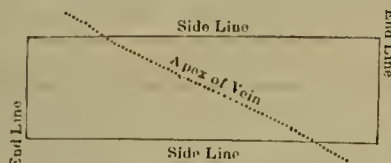
Apex and Side Lines.*

The Supreme Court of the United States has lately decided a case of unusual importance to prospectors and mine owners. It is popularly known as the Amy-Silversmith case and involves the right of the owners of veins or lodes in such part of them as may extend, in their course downward, beyond the side lines of claims.

There has been no dispute as to the right of the owner of a claim to follow his vein into the earth as far as it extends beyond the side lines of the claim where the apex of the vein crosses both of the end lines. The following diagram illustrates such a case:



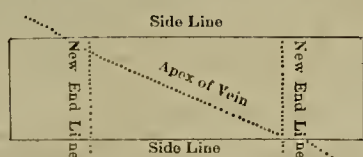
But there has always been a controversy as to what are termed the extra-lateral rights of a lode owner, where the apex of his vein does not cross the end lines, as in the following case:



In the above diagram it will be observed the vein crosses what are called the side lines of the claim instead of the end lines. In such a case, has the owner of the claim any extra-lateral rights in his vein? That is, can he follow and appropriate his vein in its downward course beyond the side lines of his claim and, if he can, to what extent?

Heretofore the State courts, as well as the courts of the United States, except the Supreme Court, have held that the vein in such a case can be followed. The only dispute has been how and to what extent?

Most of the courts, including the United States Court in Denver, have ruled that in a case such as the last diagram gives, the claim owner may draw in the end lines of his claim to the two points where the apex crosses the side lines, and that he may follow the vein indefinitely into the earth within planes formed by the new end lines extended downward and indefinitely in their own direction. Thus, using the last preceding diagram and drawing in its end lines as suggested, the following would appear:



Under the rule referred to, the claim owner in the case of the above diagram could follow his vein outside of his side lines with the vertical planes as indicated by the new end lines and the dotted lines extended from them.

A few courts had adopted a different rule, to the effect that the true strike of the vein should be ascertained and the vein could be followed beyond the side lines between vertical planes projected at right angles to the strike at the points where the vein on its true strike crossed the side lines. But the former rule was most generally accepted and seemed to strike both bench and bar as more nearly comporting with the intent of the mining statutes.

But now comes the United States Supreme Court in the Amy-Silversmith case and effectually annihilates both rules. It holds in plain and unmistakable terms that the owner of a mining claim where the apex of his vein crosses the side lines of the claim and not its end lines, has no extra-lateral rights whatever in his lode. That is, he is confined to that part of his vein which is within his claim, and he cannot follow it outside of the lines of his claim at all.

The Amy claim was a parallelogram, 1470 feet long and 491 feet wide. The side lines and the end lines were parallel. The vein ran at an angle through the claim, crossing both side lines. The Non-consolidated claim joined the Amy. It was triangular in shape.

The owner of the Amy claim followed his vein beyond the Amy side lines into the Non-consolidated claim and extracted and sold a large quantity of ore therefrom. The question was as to the ownership of the ore and that part of the Amy vein within the Non-consolidated claim. The court held that the Amy owner had no right whatever to

them and that they were the property of the Non-consolidated owner. This is its language:

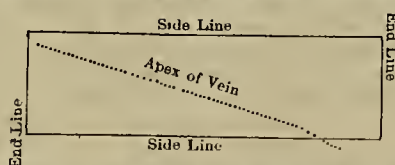
The difficulty in the present case arises from the course of the vein or lode upon which the Amy location was made. It is evident that what are called side lines of the location, as shown in the diagram, are not such in fact, but are end lines. Side lines, properly drawn, would run on each side of the course of the vein or lode, distant not more than 300 feet from the middle of such vein. In the Amy claim the lines marked as side lines cross the course of the strike of the vein and do not run parallel with it; they therefore constitute end lines. It is true the lines are not drawn with the strict care and accuracy contemplated by the statute, and which could only have been done with more perfect knowledge of the true course or strike of the vein from further developments. But, as was said by this court in *Iron Silver Mining Co. vs. Elgin Mining Co.* (118 U. S. 196, 207): "If the first locator will not or cannot make the explorations necessary to ascertain the true course of the vein and draws his end lines ignorantly, he must bear the consequences." The court cannot become a locator for the mining claimant and do for him what he alone should do for himself. The most the court can do, where the lines are drawn inaccurately and irregularly, is to give the miner such rights as his imperfect location warrants, under the statute. It cannot relocate his claim and make new side lines of end lines. Where it finds, as in this case, that what are called side lines are, in fact, end lines, the court, in determining his lateral rights, will treat such side lines as end lines and such end lines as side lines; but the court cannot make a new location for him, and thereby enlarge his rights. He must stand upon his own location, and can take only what it will give him under the law.

Acting upon this principle, there is no lateral right in the holder of the Amy claim by which he can follow its vein into the Non-consolidated claim. Mistakes in drawing the lines of a location can only be avoided, as said in the case cited, by postponing the marking of the boundaries until sufficient explorations are made to ascertain, as near as possible, the course and direction of the vein. "Even then," the court added, "with all the care possible, the end lines marked on the surface will often vary greatly from a right angle to the true course of the vein; but, whatever inconvenience or hardship may thus happen, it is better that the boundary places should be definitely determined by the lines of the surface location than that they should be subjected to perpetual readjustment according to subterranean developments subsequently made by mine workers. Such readjustments at every discovery of a change of the course of the vein would create great uncertainty in titles to mining claims."

Applying this doctrine to the case before us, it follows that the vein in controversy, the apex of which was within the surface lines of the Amy claim, did not carry the owner's right beyond the vertical plane drawn down through the north side line of that claim. The Amy claim had no lateral right by virtue of the extension of the vein through what was called the north side of the claim, and that side line so called was, in fact, one of its end lines.

The Amy decision settles the question that has been in dispute so clearly that there will be no room for controversy over it hereafter. In doing this it reverses the rules adopted in similar cases by all judges in the mining States and Territories, and for that reason the decision is of vital moment to the mining interests.

But there is another class of mining locations which it seems must be seriously affected by the decision also. It is where the apex of the vein crosses one side line and one end line. The following diagram presents the case:



The courts have heretofore held that in such a case the owner of the vein might follow it beyond his side lines, and that to determine what extent of it he might thus follow the end line which the vein did not cross should be moved up to the side line, and so much of the vein as was within the claim might be followed within the vertical planes formed by the stationary end line and the one moved up.

But the doctrine of the Amy-Silversmith case followed to its logical conclusion must reverse this rule also. To sustain the rule the court must "become a locator"—a thing which the Supreme Court says it cannot do. Says the court: "The court cannot become a locator for the mining claimant and do for him what he alone should do for himself." If the court cannot move up two end lines where the vein crosses both side lines, how can it move up one to meet the point where it crosses one of the side lines? In the case of a vein crossing one side line it is as much the

location of a claim by the court to move up an end line as where it crosses both. The *News* believes that whenever the Supreme Court of the United States has before it the case of a vein crossing one side line and one end line it will hold precisely as it did in the Amy case: That the owner cannot follow the vein outside of his vein wholly within the limits of his claim. In other words, to entitle the claim owner to follow his vein outside of his claim the apex of the vein must cross both the end lines of his claim.

This rule will impose some hardships and greater care upon the locator, and it is well for him to understand precisely what the highest court of the land requires and what it is likely to require at his hands in the location of claims.

Silver-Lead Smelting Practice.

In Two Parts—Part II.

Walter Renton Ingalls in *Engineering Magazine*.

Of course the ideas of metallurgists as to the best slags and other details vary, though within narrow limits. A very general type of slag in the Rocky mountains is a silicate, so-called, with 30 per cent silica, 40 per cent ferrous oxide, and 20 per cent lime. The specific gravity of the lime should not exceed 3.6, in order to have a good separation from the matte; so, although the fluidity of the slag increases with the percentage of iron, the latter cannot exceed a certain limit without danger of loss of silver and lead through its higher specific gravity. The lead in the charge should amount to 12 per cent, although within the past two or three years smelters who used to think they should have 15 per cent have been obliged to run as low as 8½ per cent, owing to the scarcity and increased cost of lead ore. The tenor of the charge in precious metals should be such as to make bullion with about 300 ounces of silver and one ounce of gold per ton. A good slag should not, then, carry more than 8-10 ounce silver per ton, and ¾ per cent lead.

The losses in silver-lead smelting occur in various ways, the most important being in the slag, which, however poor, carries away a large amount of the valuable metals, owing to its great volume. The loss in slag is increased in smelting charges high in zinc or low in lead, and of course also by irregularities in the running of the furnace. A certain amount of lead and silver is lost, moreover, by volatilization in the form of dust, especially with zincy ores, although a part of this is condensed and collected as fume and dust in a long series of flues or chambers and subsequently re-smelted.

The losses in smelting are taken into consideration, as a matter of course, in buying the ores. Thus only 95 per cent of the silver is paid for, while the gold brings \$19 or even \$20 per ounce. The lead is bought on fire assay, which is smelting in miniature and gives results analogous to those of the blast-furnace, but a sufficient discount is made in the rate of payment, based on the New York quotations for refined lead, to give the smelters a safe margin for refining and freight to the seaboard. The smelter looks for his profit in the charge for smelting, which varies according to the character of the ore.

The furnaces universally used in the Rocky mountains for lead smelting are rectangular shafts of fire-brick supported on iron columns which rest on a solid foundation, with a tapering bosh of hollow iron castings (water jackets) standing on a hearth of refractory material. Inside the hearth there is a crucible, forming the bottom of the furnace, connected by a siphon-tap with an external lead-well, into which the molten bullion drains and from which it is cast into bars. The slag and matte are drawn off from the front of the furnace, through a tap-hole, into large pots, where the matte settles while the slag overflows into smaller pots on wheels, in which it is carried to the waste-dump. A series of tuyeres enter the furnace at ends and sides, passing through the water jackets and protruding slightly into the bosh. The blast for smelting is thus distributed from a large pipe surrounding the furnace, which is connected with the main pipe from the blowing engines. From the top of the furnace above the charging door, the fumes are carried through a large pipe called the "down-comer" or "down-take" to the flue-dust chambers; or the furnace may be quite open at the top, level with the charging floor, in which case the fumes go off through a down-take immediately under the feed floor. The latter style of furnace is the more modern and generally approved.

The modern American lead furnace is from 30 to 42 inches wide, and 86 to 120 inches long at the tuyeres. The distance from the bottom of the crucible to the tuyeres is 30 inches, and from the tuyeres to the charging floor it is 12 to 18 feet, the height depending upon the strength of the blast. As to the latter some metallurgists advocate a blast ¾ to 1 inch pressure of mercury, and others 2 to 2½ inches.

The history of argentiferous lead-smelting in the United

* The Rocky Mountain *News* contains the above in relation to the decision of the Amy-Silversmith case. It was written by a leading Colorado lawyer and is worthy of confidence.

States since its inception at Argenta and Eureka has been a record of steady improvement, until at the present time the art has been brought to a higher degree of perfection than exists elsewhere in the world. The first furnaces built, either of the Pilz (round) or Raschette (rectangular) type, were of very faulty construction, and were capable of only a brief campaign, partly on account of errors in their design and partly owing to the fact that good fire-brick was unobtainable. Charcoal, of inferior quality, was the only kind of fuel used. There were few skilled metallurgists, and even their knowledge of scientific furnace-work was vague, smelting being carried on principally by rule-of-thumb methods. Under these conditions it is not surprising that the cost of smelting and losses in slag were high. In Eureka, in the early days, it cost \$20 to reduce a ton of ore, and losses of 40 per cent of the lead and 30 per cent of the silver are reported.

The first great improvement in the art was the introduction of the siphon-tap by Albert Arents, which revolutionized the methods of discharging products from the furnaces. This was followed in 1876 by the investigations of Anton Eilers, now at the head of one of the largest smelting companies in the United States, on the subject of lead-slugs, which was continued by Hahn, Iles and other metallurgists. Smelters then began to calculate their charges with something like accuracy, and the furnace-running was vastly improved. About the same time came the general introduction of water-jackets, which had been invented some years previously, replacing fire-brick at the smelting zone of the furnace and increasing its life. The construction, size and form of the furnace had also been improved in other respects during this time, so that the length of campaign was extended and the cost of smelting was reduced. These improvements had all been made before smelting assumed important proportions at Leadville, Colorado, but the work at that place, notwithstanding the easily reduced lead carbonate ore which its mines were then producing, was very far below the present standard. The cost of smelting in 1880 at Leadville averaged \$15.25 per ton, and treatment charges on ore \$22 per ton. The average grade of the ore smelted was 69.5 ounces per ton silver and 22½ per cent lead, about 96 per cent of the former and 88 per cent of the latter being saved.

Since the rise of the valley smelters, developments in the lead-smelting industry have been rapid and important. The concentration of works into a few large plants and the handling of larger quantities of ore in each have reduced general expenses; labor-saving devices have been introduced for handling ore, slag, matte and bullion; furnace-work has been brought to a higher degree of perfection than exists in Germany, where many of our best metallurgists were trained; and the furnaces themselves have been improved vastly in construction and size. Where furnaces 24 inches square at the tuyeres, smelting eight or nine tons of ore per 24 hours, were used in Eureka 20 years ago, we now have furnaces 120 inches long and 42 inches wide, smelting 80 tons. Instead of losses of 40 per cent in lead and 30 per cent in silver, as much as 94 per cent of the lead is recovered, and it is bad work indeed if 95 per cent of the silver is not saved—and this with charges running only 9 or 10 per cent in lead against 40 to 48 per cent in Eureka. Instead of a cost of \$20 per ton for smelting, we have an average in Denver of only \$4.50 per ton, for a neutral ore (not including roasting, which costs less than \$2 per ton).

The old type of round furnaces, still used almost entirely in Germany, has nearly disappeared in the United States, having been replaced by the modern rectangular furnace, itself the successor of the Raschette. This change has come about because the smelting capacity of a furnace is limited by the distance between the tuyeres, which it is agreed should not exceed 42 inches, wherefore a rectangular furnace can be built, obviously, with greater capacity than a round furnace.

Important changes have occurred in the past five years in the character of ores treated. The easily smelted carbonate ores of Leadville have been gradually exhausted, and smelters are now obliged to look for their lead in the sulphide of ores of Bingham and the Cœur d'Alene, which require, more or less, a preliminary roasting. The quantity of iron sulphid ores and concentrates in the market also has increased, and this class of ore is bought freely by the smelters, with whom it replaces a certain amount of oxide of iron flux, which has to be brought chiefly from Leadville, on unprofitable terms. Now all the large smelting works are equipped with roasting furnaces, where formerly they had none, and mechanical furnaces, like the O'Hara and Pearce, are being introduced in place of the old form of reverberatory furnaces; sulphide ores are now the common, and oxide ores the rare, class of material which come to market.

At the present time we cannot see great improvements that can be made in our practice of lead smelting. The general arrangement of the works is good, and the me-

chanical devices for handling products seem to be complete. The construction of the furnaces does not seem likely to undergo radical changes unless it is possible, as Professor H. O. Hoffman suggests, to substitute some suitable refractory material, such as coke-brick, for the water-jackets, which abstract a good deal of heat. The present state of furnace metallurgy, also, leaves little to be looked for in these days when fierce competition has forced every man to do his best. Still it can never be said that perfection has been reached, and the future may bring new and important developments, but it may be confidently asserted that the changes in the next ten years will not be so revolutionary as in the last.

American Improvements and Inventions.

Discussion by Prof. H. O. Hoffman, Boston, of a Paper Read by James Douglas, New York, before the American Engineering Congress.

In his review, Mr. Douglas has necessarily compressed a very large subject into very small compass. I should like to add a few supplementary remarks on the treatment of argentiferous lead ores.

First as to sampling. This has been brought to great perfection within the past seven or eight years, by reason of the fact that a few large smelters, centrally located for ores, fuels and fluxes, have replaced many of the smaller ones which formerly existed. In the latter, hand-sampling with the ordinary implements or with improved ones, like the Brunton sampling shovel, was sufficient; but in the large works a more rapid and less expensive method became necessary, and machine sampling was introduced. This consisted at first in separating continuously a small part of a running stream of ore; afterward it was found better to take the whole width of the stream at short intervals of time. Of the machines for doing this, the three representative ones are those of Brunton, Bridgman and Constant, all excellent. To prepare the sample for the laboratory, we have the sample grinders of the coffee-mill type, as made by our leading firms, and the quartering apparatus (laboratory samplers) of Bridgman and others.

Coming to the calcination of ores, special attention must be called to the improved construction of the furnaces and to the making-up of the charges. In the stationary hearth-furnace, besides increasing its inside width to 16 feet, the roasting-hearth has been separated from the fusing-hearth by a vertical flue, and the area of the vertical section of the latter has been made smaller. The products of combustion passing from the fireplace over the small fusing-hearth rise in the flue and then suddenly expand, filling the entire width of the roasting-hearth. Thus it has been made possible to keep a high heat in the fusing-hearth and a low heat in the roasting-hearth, and to let the latter discharge into the former. With mechanical rables the roasted ore is collected in a hopper, which is emptied at intervals into the slagging-hearth. In the making-up of roasting charges, new problems had to be solved. In foreign works the ores to be slag-roasted are galena concentrates rich in lead, while the sulphide ores which our Western smelters have to treat are usually mixtures, low in lead, of pyrite, blende, galena, etc., and gangue. To slag these requires a high temperature, which is liable to cause loss of lead and silver by volatilization; and, as an entirely satisfactory method of condensing the fumes from a slagging furnace has not yet been devised, the only way of reducing the loss seems to be not to slag charges containing over ten per cent of lead and 100 ounces of silver to the ton—some metallurgists say even less.

In the shaft-furnace, the form and the material used are much alike at all works. While 42 by 120 inches is now a common size, some smelters think 33 by 100 inches the most favorable for doing clean and cheap work. Formerly the standard distance between the tuyeres was 36 inches. The natural tendency to increase the capacity of the furnace prompted its extension to as much as 60 inches, water-cooled tuyere nozzles being allowed to protrude through the water-jackets, so as to make the actual distance 48 inches. The pressure from the strong blast necessary to penetrate a charge of such thickness made the heat in the furnace creep up, with the result of excessive loss in metal. This caused a reaction, and the distance was reduced in some instances to 30 inches; at present it varies from 33 to 42 inches. Some furnacemen think 120 inches too long for a furnace, and do not like to exceed 100 inches.

In the management of a furnace, beside the making of a correct slag, its separation from the matte, especially with zincy ores, and the collection of flue-dust, have given much trouble, and are still doing so to some extent. Mr. Douglas praises the Mathewson tapping-jacket as promoting a good separation, but omits to mention that of Mr. E. F. Eurich, which resembles it very much. Dr. Iles accomplishes the work in an entirely different way. He collects the liquid matte and slag from six blast furnaces (42 by 120 inches) in a reverberatory furnace heated by a separate

fireplace. Matte and slag are not only well separated, but their further handling is greatly cheapened. It would seem as if, with a smaller number of furnaces and a continuous flow, a Herreshoff or Orford well, or, if necessary, a combination of the two, would give a satisfactory separation. For the collecting of fumes, the simple and effective manner of cooling the walls of dust-fines and dust-chambers in use at the Grant and Omaha Works, Denver, Colo., should not be overlooked. I refer to the use of hollow bricks, through which air circulates. It is a simple and excellent way of surmounting one of the principal difficulties in condensing flue-dust, namely, the cooling of the gases; the other—the retarding of the current—has been happily dealt with by Freudenberg. In the management of the furnace, special stress must be laid on the fact that the making-up of the charge is now almost wholly governed by chemical principles, instead of mere experiment as in former years. For this introduction of a scientific instead of an empirical method, the American lead smelter can take much credit to himself.

The improvements made in the desilverization by the refiner are in no degree inferior to those made by the smelter, and have been along the same line. The distribution of precious metal in the base bullion has been carefully studied, and methods of sampling have been devised which are accurate and quick. Here, also, in some instances, machine work has replaced hand work. In the general arrangement of plant, the apparatus and its management are so planned that the base bullion, when charged into the softening furnace at the top of the works, is not handled again until it is ready to be loaded at the lower end, as refined lead, into the cars. The bars are moulded, not by ladling, but by some one of the several simple mechanical devices for that purpose. The capacity of the desilverizing kettle, by which that of the remaining apparatus is regulated, has been increased from the original 12½ tons to 30, and in a few instances to 45 and 50 tons. The kettle is discharged by that simple and beautiful invention, the Steitz syphon. The manner of working is being continually simplified. To-day, base bullion, running 300 ounces silver and gold to the ton, is desilverized by two sinkings, if no separate gold crust is to be made; otherwise by three. The liquation of the crusts has also been greatly improved; and retorting, although invented by Parkes many years ago, only became the established method of work after it had been perfected here by Balbach. In cupelling, the principle of the English furnace has been adhered to; but the form, size, filling and manner of support of the test, the apparatus for blowing, the mode of working, etc., all have been so changed and improved as to make an entirely new furnace, suited to the daily increasing demands made upon the refiner. In the record of improvements the working up of by-products must not be forgotten. This is now done as fast as they are made, thus leaving only a comparatively small amount of metal circulating in the works.

All the splendid achievements of American lead-smelting and refining have been made within the past 30 years; and, without disparagement of the labors of any others who have contributed to this result, I think we may well recall the names of O. H. Hahn and A. Eilers among smelters and E. F. Eurich and the late A. Steltz among refiners as pioneers of improvement—all of them members of the Institute.

Gold Mining in the Colony of Victoria.

The following note on the Bendigo gold field, Victoria, is compiled from a report of E. J. Dunn, F. G. S., to the Secretary for Mines, Melbourne. The city of Bendigo, around which gold workings extend for several miles in all directions, is about 100 miles northwest from Melbourne. Its longitude is 144° 16' 39" east, and latitude 36° 45' 10" south.

In the valleys the operation of extracting the gold from the alluvial deposits reaches a depth of from 10 to more than 100 feet; in the flats and gullies these deposits are only shallow.

Two large boards of alluvial gold which are scattered through the shallow gravels of the gullies and creeks around Bendigo were, in Mr. Dunn's opinion, gathered from the surrounding rocks by denuding agencies.

The gold obtained by mining in the gold field is found chiefly in the lower slurian strata, which extend over an area of 435 square miles. Of this area the Bendigo gold field occupies an area of about 140 square miles, the length being 20 and the width 7 miles. The strata are much contorted and corrugated, forming no less than eleven anticlines in a width of 10,000 to 11,000 feet, the center one being called the New Chum. These axial lines run pretty uniformly through the gold field for a distance of seven or eight miles. Mining is carried on very systematically and to a very great depth. The Lazarus Company, on the New Chum line of reefs, have sunk a shaft to a depth of

2209 feet below the pit bank. From this shaft, crosscuts or tunnels have been driven across the measures at right angles to the axial lines. Twenty-five crosscuts have thus been driven at this mine at different depths—the first one being at 199 feet 7 inches, the lowest at 2209 feet. In this shaft, gold reefs, quartz or spurs have been found and mined more or less all the way down.

At the North Johnson's mine, a shaft has been put down to a depth of 1642 feet 6 inches; from this shaft crosscuts or tunnels are driven across the measures at right angles to the anticlinal lloes, at different depths, by which the quartz reefs and spurs are intersected and mined. In addition to these there are numerous other shafts.

Each of the axial lines referred to contains several reefs, lying one below the other. The most peculiar feature about the quartz veins of the district is the occurrence of the so-called saddle reefs. These are bodies of quartz of lenticular form that are bent over the axial lines, both anticlinal and synclinal, but only to a moderate extent are they found along the synclinals. The saddle reefs are of great size in places, of remarkable persistence in length, and are also notable for recurring in depth one below the other.

Although mining operations have been carried on in this gold field somewhat extensively during the past 40 years, the extent of ground so far mined is insignificant compared to that which remains to be developed.

Auriferous Beaches of New South Wales.

The Evans river, known locally as the Little river, rises in the parish of Riley, county Richmond, New South Wales, half a mile to the south of the township of Woodburn, New South Wales, and flows to the east into the Pacific ocean. For many years gold has been won in patches along the coast from Port Macquarie to the Queensland border; and deposits have been described by the late C. S. Wilkinson in various reports. At Ballina the occurrence is of special interest, as the precious metal has been derived from the denudation of a sheet of basalt, which has been proved by bulk crushings to be auriferous. A description of the formations, made by George A. Stonler, geological surveyor, for the government, will be of much interest to the beach miners of this coast.

On the northern bank of the Evans river there is a wide, somewhat fan-shaped flat, which extends to the Richmond river, and is formed partly of fresh-water alluvium (the rich agricultural soil of the district) and partly covered by blown sand. To the southwest of the Evans river there is an extensive development of the sandstone and shale of the Clarence coal measures, which, with a boss of felsite, form a large headland at the mouth of the river, with the bold outcrop characteristics of the sandstones of the measures. Coming south the rock is lost under a coverlog of blown sand, which occupies, at a distance of three miles from the river, a fairly large area, and is arranged in lines of dunes, which attain, in one instance, a height of 130 feet and are sufficiently continuous to be termed a range, while others are in the form of ridges and eminences separated by swampy flats. They are of somewhat rounded outline, and are mostly covered with heath, which binds the surface of what would otherwise be shifting sands. These æolian deposits occupy an area somewhat lozenge-shaped and measuring about three miles in the greatest width, and having a length of seven miles as far as examined; they are bounded on the west by sandstones, etc., of the coal measures, and at Bullock creek, above the center of the area, there is a small outlier of slate of lower carboniferous (?) age.

Gold has been obtained from three distinct deposits, which are giving employment at the present time to about 50 miners.

(1) Present sea beach. After each tide a certain quantity of black sand containing fine gold and platinum is found to have been thrown in streaks upon the beach, but as the amount of the deposit depends upon the favorable conditions of wind, tide and weather, it is only at intervals that the sand is worth working. The uncertainty of the waves bringing up a fresh and workable quantity of sand for a considerable period of time makes the occupation of a comber precarious; and as there is no great labor entailed, the beach can be kept fairly combed by the settlers in the immediate neighborhood. The beach is narrow and inclined, and is often quite covered by the surf.

(2) An auriferous deposit of black sand has been worked in patches for a length of about two miles. A fairly large amount of gold has been won—it is said that one small property yielded 1000 ounces of gold—and although there are two or three claims with a couple of months' work in sight, the bulk of gold in the deposit has been extracted. The stripping consists of a loose sand, varying in thickness from three to sixteen feet. I had no opportunity of measuring the thickness of black sand, as none of the claims were in full work.

(3) Some six months ago Messrs. Nobbs and McGeary were prospecting a quarter of a mile inland from the coast, and discovered a deposit of auriferous black sand, which is about six feet above ordinary high-water mark, and has probably been formed in the same way as the two deposits already referred to. The "terrace" has been traced for some four miles in length, and though doubtless continuous at one time, it has been denuded, and now occurs in outlying patches, of different lengths and with a maximum width of 100 feet, which are covered by drift sand varying from a few feet to 25 feet in thickness. The black sand measures from one to five feet in thickness, and has a decided dip seaward; it is thickest in the center, and thins off at both sides. In color it varies from whitish gray to black, according to the amount of iron present, and it consists chiefly of minute grains of quartz and a little topaz, fine specks and pellets of ilmenite (titanic iron), gold, tin, platinum and platinum metals, a little magnetite and limonite, small garnets (?), and occasionally a few flat sandstone pebbles, the largest hitherto seen measuring one foot by eight inches by two inches. The quartz grains are white and opaque, with a large sprinkling of pieces of rock crystal; a few show traces of crystalline facets, but most of them are well rounded. As a rule, the black sand rests upon, and at the side passes imperceptibly into, a white sand, consisting chiefly of fine and well-rounded quartz grains; generally it also overlies, and at some places, at the sides, butts against a rock locally known as the "black rock," which latter is a consolidated sand, ferruginous and peaty, and in places quite compact. The rock is said to carry gold in places, and is considered to be bedrock; but although it is a boundary rock for the deposits which have been discovered, it is not bedrock in the true sense of the term. If slate similar to that which occurs at Bullock creek, or sandstone identical with the Evans river sandstone, be touched, it is useless to continue sinking in the hope of discovering a deposit of black sand, but the "black rock" belongs to a formation distinct from both sandstone and slate, and although in places it may rest directly upon bedrock, it is possible that in other parts auriferous black sand may be found beneath it.

The gold, which has a value up to £4 2s 3d per ounce, is very fine, and the samples I examined were free from rust; most of the specks are somewhat 'shotty,' and should be readily saved on copper plates, but there is a certain proportion which is scaly and liable to be lost. On most of the claims the ordinary box, followed by copper plates and blankets, is used for collecting the gold, and it seemed to me that in most cases the quantity of water flowing over the plates was excessive, and the plates themselves were not kept sufficiently bright to save the float gold; when the last copper plate is found to be thickly covered with amalgam, there cannot be much doubt that gold is being lost. The miners say that if they attempt to save all the gold a smaller quantity of pay dirt will be put through, and that they prefer the greater output with the attendant loss rather than a smaller quantity treated with a more perfect saving of the metal.

With the gold are associated platinum and platheid metals. The platinum is of a steel gray color, and occurs chiefly as minute flat specks with a metallic luster, and of a more or less circular longitudinal section, occasionally turned up at the edges.

A RESIDENT of Lander county furnishes the Carson *Tribune* with the following information on the situation in Austin: "Although Austin is by no means a lively camp, there are but few idle people to be seen. The Austin Mining Company has about 100 men employed in the mine and mill. The main shaft is down 750 feet, good ore being found all through the ledge, and from 40 to 50 tons being extracted every day, the majority being worked by the concentrating process and the higher grade stowed away for shipment."

NEGOTIATIONS are pending at Victoria, B. C., for bonding the lands on the northern end of Gabriola island to a New York syndicate. They have a representative inspecting the coal treasures of the district. The New Vancouver Coal Company owns several thousand acres in the southern and central portions of the island, which is situated about three miles from Nanaimo, and the people are also said to be inquiring as to iron deposits at Sooke, near Victoria, which have been reported on most favorably by eminent engineers.

THERE are probably 1000 men at work in and around the various mining camps of Big Bug, Chaparral and Lynx Creek districts, which are all within 20 miles of Prescott, Arizona. Seventy-five men are on the payroll of the Henrietta mine alone, and nearly as many more are employed in various capacities in the camp. Nearly an equal number is employed at John S. Jones' camp and a large number more at the McCabe mine.

The Hurleton District, Butte County.

Abridged from Article in *Forbestown Mining New Era*.

Hurleton is situated about 12 miles east of Oroville, and 10 miles west of Forbestown, at an altitude of about 1200 feet, and is on what is known as the Oroville, Forbestown and La Porte road. It was established by its present owner, Smith H. Hurles, about 40 years ago, and has ever been a favorite stopping place for those traveling over the road. It contains a postoffice, store, hotel, and is the place for changing horses by the Oroville & Forbestown Stage Company. It is below the snow belt, and has as healthy and agreeable climate as can be found in the State.

It is also in a very promising mining section, being surrounded by quartz ledges, many of which are known to be valuable, which in time cannot fail to make it an important place. In earlier days considerable gold was taken from creeks and ravines in the immediate vicinity, but these are now about exhausted and the attention of the miner has been turned to quartz.

The first place recently visited by us was the Phoenix quartz mine, of which Capt. Rodda is superintendent. Being Sunday, no work was going on in the mine, but we found Mr. Rodda at the mill, which was also shut down for a few hours to clean up and make some slight repairs. The superintendent reported everything running smoothly and the results satisfactory. The mill now used is known as the Bryan roller mill and does the work very well. But the superintendent informed us that the mill was not intended by the company to be a permanent fixture, but more for the purpose of prospecting, and that in the near future a stamp mill would be built. This mill is so situated that ore from three ledges which the company own can be worked in it. At present they are running on ore from the Phoenix ledge, which has to be hauled about a mile; but the site for the new mill is much nearer the mine. Capt. Rodda is an old and experienced miner, having worked in several camps in California and also in Mexico, and speaks in the highest terms of the mines he has charge of, and also of several other ledges in the vicinity upon which development has been done. The rock, as a rule, does not carry as much sulphurets as that around Forbestown, the gold being more free.

Just above the Phoenix mine is the Resumption mine, owned by McMillian and son. This is a good-sized ledge and some very good ore has been taken from it. The owners are talking of putting up an arrastra to fully develop the same.

We also visited the Dutch Ravine mine, owned by H. P. Stow of Forbestown. Here work was also suspended for the day, but we met the superintendent, Mr. Hampton, and from him we learned that 12 men were employed; that the shaft was down 160 feet; that the workmen were now engaged in driving a tunnel to tap the ledge; that they were making about 80 feet per month, and that about 300 feet would have to be run before the ledge would be reached. Mr. Stow has great faith in this mine, as is evidenced by the work he is doing to open it. The shaft is well timbered, and when the ledge is reached it can be used as a hoist. The mill, if one is built, will be below the shaft and be driven by water power. Everybody in the neighborhood is looking forward to the tapping of the ledge as a period that will awaken a new era in mining in that vicinity.

We visited a recently discovered ledge known as the Hurleton King, and owned by W. W. McMillian, Jr. This ledge commences to show itself near the main road, a short distance above the Hurleton hotel, and can be traced by croppings for nearly a mile. Its course is nearly north and south, and at a point where a small opening has been made it shows a width of six feet, and in several pieces of rock carelessly picked up from that which had been thrown out, we discovered free gold. The rock carries considerable sulphurets and has every appearance of being rich. The beauty of it is that it can be easily and cheaply worked. There being a splendid site for a mill under the Forbestown ditch, water can be used and returned to the ditch without waste, and the ledge can be tapped within a few feet of the mill.

Mr. Hurles also has a fine looking ledge on his land, about a quarter of a mile from the hotel, which assays show to be valuable. This, as is the case of the Hurleton King, is under the Forbestown ditch, and for a mill site has the same advantages. Mr. Hurles has had several experts examine his mine and there are prospects of a sale or bond in the near future.

We also visited several of the undeveloped ledges and thought we saw a bright future in store for the district, but a great deal depends upon the success of Mr. Stow's operation in Dutch ravine. Should this prove a success and a paying mine be developed, there will be no lack of capital for other operations. The country around Hurleton is one network of quartz, and we predict that some day one of the largest and most prosperous mining camps in the State will be found here.

Scientific Progress.

The Seven Images of the Human Eye.

It is well known that in the human eye, besides the refracted image, which serves the purposes of vision, there are formed three reflected images known under the name of "Purkinje's Images." M. Tcherning has discovered three additional ones, so that the total number is brought up to seven.

In its passage into the interior of the eye each ray of light has to pass through the cornea, the aqueous humor, the crystalline lens, and the vitreous humor, before finally arriving at the retina. At the surface of each of these constituents the ray is liable to be partially reflected, thus giving rise to four reflected images. These were all seen and described by Purkinje at the beginning of the century, but only three were observed by Helmholtz and others. These three, says a writer in *Nature*, can be easily observed by two persons on holding a lighted match between their eyes, and moving it about so that the reflections seem to come from the pupil. One of them, that reflected by the front of the cornea, is much brighter than the two others, which are formed by the front surfaces of the crystalline and the vitreous humor, respectively. The fourth image is due to reflection from the posterior surface of the cornea. It may be discovered by careful observation of the brightest image by means of a magnifying glass. As it approaches the border of the pupil, and especially as it passes on to the iris, it is seen to be accompanied by a small, pale, but well-defined image, which always lies between the first image and the center of the pupil, the distance between them decreasing as they move toward the center, where they finally coincide. By means of the ophthalmometer—an instrument consisting of three incandescent lamps and a telescope arranged on an arc of 86 cm. radius—it was found possible to measure the radii of curvature of all the reflecting surfaces. The foci of the two reflecting surfaces of the cornea were found to coincide, a fact which accounts for the coincidence of the two corresponding images at the center of the pupil, and for Helmholtz's failure of finding the fainter one.

It is evident that since the light reflected from the successive surfaces does not fall upon the retina, it is lost for visual purposes. But a comparison of the percentages of loss in the case of the eye, and in that of a simple lens, tells greatly in favor of the former as an optical instrument. In the eye the percentage of useful light is 97, in a simple lens 92, and in a compound optical instrument correspondingly less. But the light reflected by any one of the internal surfaces is also liable to be reflected back into the eye or the optical instrument, with the effect of super-imposing a more or less faint patch of light upon the image on the retina. This is termed the noxious light (*lumiere nuisible*) by M. Tcherning. In a simple lens this amounts to $\frac{1}{2}$ per cent, while in the eye it is as low as 0.002 per cent. But faint as it is, it is capable of giving rise to two light impressions due to double reflection, one, at least, of which has been actually observed in the human eye. "The easiest way of observing it," says M. Tcherning, "is to look straight forward in a dark room, holding a lighted candle in the hand, about 20 cm. from the line of vision. On moving the candle gently from side to side, a pale image of the flame is seen on the opposite side of the line of vision, distinct enough to show that it is inverted; it moves symmetrically to the candle with respect to the line of vision. The rays which form this image have undergone, besides several refractions, two reflections, one at the posterior surface of the crystalline and another at the front surface of the cornea." Another image was expected to be formed by a similar reflection

at the anterior surface of the crystalline. It was found in an artificial eye, but not in the human sense-organ. However, an easy calculation of the optical system of the eye explains this circumstance. The focus of the reflected rays is very near the crystalline lens itself, so that they must be much dispersed by the time they reach the retina. To enable the image to be formed on the retina, the object would have to lie between the cornea and the crystalline, but on attempting to form a luminous point at that place by optical means, it is found that the "useful rays" fill the eye to such an extent as to render everything else invisible.

It is found that different eyes differ in their capacity of seeing the first of the two additional subjective images. Short-sighted people find it very indistinct unless the candle is held close to the eye, or convex glasses are used. As the maker of optical instruments utilizes the accessory images for testing the degree of polish and the accurate centering of the lenses, so the physician is enabled to make valuable inferences from them as to the structure and condition of the eye he is examining; and the additional images discovered by M. Tcherning appear to be of considerable physiological importance.

The Influence of the Mind Upon the Body.

J. E. Wenman, M. D., in the *Eclectic Medical Journal*, says: In Mr. Warburton's work on Egypt he describes his experience with a famous magician in that country. He, being sent for, came to Mr. Warburton's hotel to give him an exhibition of his skill. The magician calls a boy from the street, and makes a mysterious mark upon the palm of his hand, requesting him to look steadfastly upon the mark. This the boy did for ten minutes without any effect. The magician called another boy, and repeated the same thing. This boy, being susceptible to the influence, was soon in a semi-mesmeric condition, the object of the mysterious mark on the palm of the boy's hand being the means of putting the boy in a passive condition. The magician now requested Mr. Warburton to call up whom he wished, and stated the boy would see him. Mr. Warburton called for the late Lord Derby. The boy instantly called out: "Here he is. I see an old man, with spectacles, lying on a couch, having on a long black robe." Mr. Warburton next called for the late Lord Nelson. The boy said: "Here he is. I see a soldier with one arm." After calling for several others, the boy minutely described them, to the astonishment of Mr. Warburton and his friends.

Now the trick consisted in getting the boy to suspend his thinking faculties, so that he would become in a semi-mesmeric condition, and thus be in sympathy with the mind of Mr. Warburton when he called for the different individuals. The boy saw in a kind of vision the very picture that was passing through Mr. Warburton's mind when he called for these individuals. This is a high development of a clairvoyant condition.

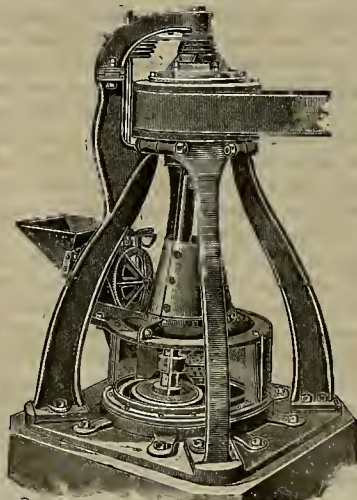
Transparency of the Ether.

A noticeable point in connection with the free transmission of light through space is that, so far as the ether itself is concerned all colors are, in the opinion of astronomers equally unaffected by absorption, says the *Optician*. The fact is accounted for, presumably, by the enormous frequency of the simple vibrations of the etherial elements, rendering such vibrations alike incomparable with those of either red or blue light. If it be assumed that the ether is pervaded by some definite minimum of heat motion, it is, however, necessary to admit the existence in it of an absorption band. And it is impossible that there can be sensible heat in the ether unaccompanied by absorption of an equally sensible character.

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Mechanical Progress.

Superheated Steam in Small Motors.

Some remarkable results have recently been obtained in a trial of a Serpollet motor, conducted by M. Segnin. These results are particularly interesting, as they show the economical advantages of superheated steam in a noteworthy manner. The motor, as described by *Engineering*, England, as having a single horizontal cylinder, 5.1-inch diameter by 5.1-inch stroke. The cutoff was fixed at 66 per cent of the stroke; the admission pressure was 58 pounds per square inch, and the revolutions 248 per minute. The brake horse power on a four hours trial averaged 4.57-horse power, and the steam consumption was but 29.87 pounds per brake horse power per hour. Comparing this result with those obtained with somewhat similar-sized motors at the Plymouth trials of the Royal Agricultural Society, England, it will be found that the best engine there, a compound one, took 35.75 pounds of steam per indicated horse power, whilst the best of the single-cylinder engines took 57.75 pounds of steam per indicated horse power. Practically the whole of the advantage shown by the Serpollet motor must, we think, be credited to the boiler, which supplies superheated steam. This boiler consists of a stout tube flattened so as to deform the passage through into a narrow slit. This tube is coiled, and has one end connected with a feed pump, and the other with the engine to be driven. The boiler used in the above tests had a heating surface of 26.8 square feet, and the grate area was 2.9 square feet. The steam, though showing on the gauge a pressure of 58 pounds per square inch only, had a temperature of 1009° F. on issuing from the coil, which had fallen to 572° F. at the steam chest. The temperature of saturated steam at 58-pound pressure is about 306° F., so as used in the engine the steam was superheated by some 266°. The output of steam was just 4.9 pounds per square foot of heating surface per hour. The fuel used was briquettes, having a heating value as tested in a calorimeter of 8.28 pounds of water evaporated from and at 212° F. per pound of fuel, and as used in the boiler the efficiency was 67.3 per cent.

Improved Steam Pipes.

To obviate the risk of careless brazing, and enable the thickness of sheet copper forming the pipe to be reduced to a minimum, at the same time that full advantage of wire winding is secured, a patented system of manufacturing steam pipes is being experimented with by a west of Scotland firm, says the *Scientific American*. It forms even a closer analogy to the wire gun than the present system of wire winding, and consists of using copper of the thinnest practical gauge, to form the interior or core of the pipe, the body of the pipe proper being composed of steel wire wound closely round the core, the interstices between the coils being filled in solid with copper by a patented system of copper electro-deposition. Pending this and other possible improvements on copper pipes, one result of past experience with these is to give an impetus to the use of lap-welded wrought-iron pipes. In the new Connard steamers, Campania and Lucania, the main steam pipes are of this type, and experience with these so far hears out the contention of some engineers that for modern high pressures they are, on the whole, the best that can be used.

Large Pulleys.

It is a mistake to use pulleys very small in diameter when large ones can be used just as well. It is true that small pulleys do not cost as much as large ones, but when that is said, all has been said that can be said in favor of the use of small pulleys;

while in favor of large pulleys as substitutes for the small ones, it can be said they save money during their entire lifetime, and therefore probably save many times the difference in first cost.

A six-inch belt on a pair of twelve-inch pulleys may be able, says *Dixie*, to do just the work required without slipping or extraordinary strain, and in so doing will, with care, perhaps live the ordinary lifetime of such a belt, yielding at last from sheer exhaustion; whereas if the same belt were run on 24-inch pulleys instead, it is reasonable to suppose it would last twice as long, with the same care, because the constant strain would be only half so great. But then with 24-inch pulley it would not be necessary to use six-inch belts, as a belt four inches wide would do the work easier than a six-inch or twelve-inch pulleys, and would last longer if of equally good quality. Either way, the larger pulleys are, in the end, by far the most profitable and should always be selected in preference to small ones if other conditions will permit it.

Manufacture of Bronze Powder.

Nearly a hundred establishments are engaged in the manufacture of bronze powder in and near the cities of Furth and Nuremberg, Germany. The article is composed of copper, tin, zinc and antimony, melted in proper proportions, and cast first into rods of half an inch in diameter and about three feet long, these rods being rolled until about two inches wide and then cut into suitable lengths for handling. The pieces go to the hammers, where they are beaten into a very small fraction of their former thickness and are then taken to a sulphuric acid bath, where each sheet is washed to remove all impurities, rust and dirt. After being thoroughly dried, the sheets are again hammered by steam hammers until no further reduction is possible, there being a limit to which machinery can be used.

Up to this stage the treatment which the metal receives, whether intended for powder or metal leaf, is identical; but now the process changes. If designed for metal leaf, the further heating is done by hand; but if for bronze powder, the sheets go to the shears, where they are cut up into small particles and become known as clippings. These are now ready for the stamp mills, which are run in batteries, enabling one man to run or attend 50 or more. When sufficiently pulverized, the powder is sifted in a special manner, the heavier and better qualities going to one receptacle and the inferior grades to another.—*American Paper Trade*.

Cutting Mica.

At the glass house the mica is put into shape for shipment. The blocks vary greatly in size. One from the Wiseman mine, near Spruce Pine, is reported to have been six feet long by three feet wide. Pieces a yard in diameter have been obtained at the Ray mine, in Yancey county, and similarly large plates have been found in Siberia, but these are exceptional. The average block is little larger than the page of a magazine, and is generally less than six inches in thickness. It separates very readily into sheets parallel to the base of the prism. It is estimated that this cleavage may be carried so far that it would take three hundred thousand of the mica plates to make an inch. It is needless to say, however, that such a thickness is not suitable for service in stoves and furnaces. The mica is generally split into plates varying from about one-eighth to one-sixty-fourth of an inch in thickness. In preparing these plates for market, the first step is to cut them into suitable sizes. Women are frequently employed in this work, and do it as well as, if not better than, the men. The cutter sits on a special bench which is provided with a huge pair of shears, one leg of which is firmly set to the bench itself,

while the movable leg is within convenient grasp. It is requisite that the shears shall be sharp and true, for otherwise they will tear the mica.

The patterns according to which the mica is cut are arranged in a case near at hand. They are made of tin, wood, or pasteboard, according to the preference of the establishment. Generally they are simple rectangles, varying in size from about four square inches to eighty.—C. H. Henderson, in the *Popular Science Monthly*.

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Useful Information.

Famous Meteoric Stones.

A meteoric stone, which is described by Pliny as being as large as a wagon, fell near Agopotami, in Asia Minor, in 467 B. C. About A. D. 1500 a stone weighing 1400 pounds fell in Mexico, and is now in the Smithsonian Institution at Washington. The largest meteoric masses on record were heard of first by Captain Ross, the Arctic explorer, through some Esquimaux. These lay on the west coast of Greenland, and were subsequently found by the Swedish exploring party of 1870. One of them, now in the Royal Museum of Stockholm, weighs over 50,000 pounds, and is the largest specimen known.

Two remarkable meteorites have fallen in Iowa, says the *San Francisco Call*, within the past 20 years. February 12, 1875, an exceedingly brilliant meteor, in the form of an elongated horseshoe, was seen throughout a region of at least 400 miles in length and 250 in breadth, lying in Missouri and Iowa. It is described as "without a tail, but having a flowing jacket of flame. Detonations were heard so violent as to shake the earth, and to jar the windows like the shock of an earthquake," as it fell about 10:30 P. M., a few miles east of Marengo, Ia. The ground for the space of some seven miles in length by two to four miles in breadth was strewn with fragments of this meteor, varying in weight from a few ounces to 74 pounds.

On May 10, 1879, a large and extraordinary luminous meteor exploded with terrific noise, followed at slight intervals with less violent detonations, and struck the earth in the edge of a ravine near Estherville, Emmet county, Ia., penetrating to a depth of 14 feet. Within two miles other fragments were found, one of which weighed 170 pounds and another 32 pounds. The principal mass weighed 400 pounds. All the discovered parts aggregated about 640 pounds. The one of 170 pounds is now in the cabinet of the State University of Minnesota. The composition of this aerolite is peculiar in many respects; but, as in nearly all aerolites, there is a considerable proportion of iron and nickel.

It is generally held that meteors at one time or another formed integral parts of a comet. The meteor enters the earth's atmosphere from without with a velocity relative to the earth that is comparable with the earth's velocity in its orbit, which is 19 miles per second. By the resistance it meets in penetrating the air, the light and the other phenomenon of the luminous train are produced. Many small meteorites are undoubtedly consumed by this fire, caused by friction, before they reach the earth's surface.

Florida Ants.

There are more ants to the square mile in Florida, says the *Savannah News*, than in any other country in the world. There are ants which will measure more than half an inch in length, and then there are ants so small that they can scarcely be seen to move with the unaided eye. There are red ants and black ants and troublesome ants. But as bad as they are, I have never heard of them eating out the seat of a man's trousers, as a missionary, the Rev. Mr. Wilson, once told the writer he saw the army ants do in India while the man was sitting on the earth for a few minutes beside him. But the Florida ants will take out lettuce and other minute seeds from the soil in which they are planted and actually destroy the seeds. They will suck the life out of acres of young cucumbers and melon plants, niproot strawberry plants or cover the buds with earth to such an extent as to kill them. They will get into pie, pickle, sauce, syrup, sugar; on meat, in hash; will riddle a cake or fill a loaf of baker's bread

till it is worthless. All remedies failing, I took to baiting them near their nests with slices of meat, bones, apple and pear parings, and when I had from 50,000 to 100,000 out, I would turn a kettle of boiling water on them. I have killed during the past week over a million in the space of a quarter-acre lot, and I have almost wiped them out. I had to do this to secure any lettuce plants, and many inobservant farmers complain of seedsmen when they should attribute their troubles to insects.

Boiling Water Not Always Hot.

"Cold boiling water, indeed! Boiling water is the hottest kind of thing. Don't I know? Haven't I scalded my fingers more than once with water from the teakettle?"

James is right, and yet he is wrong, remarks the *New Orleans Times-Democrat*. Boiling water is not always very hot water, in spite of his painful experience. This is the way it happens:

When the water boils, ordinarily it is because great heat has separated the tiny particles of the water, forcing upward and outward in lively bubbles the air which is contained in them. This is done in spite of the downward pressure of the atmosphere. After the water has become hot enough to boil, it can get no hotter, because the air escapes as fast as it is sufficiently heated to do so.

There are places on the earth where the pressure of the atmosphere upon the water is so slight that it requires but little heat to push apart the particles and set free the air bubbles which are confined in the water, so it begins to boil before it becomes very hot. It ought hardly to be called cold water, perhaps, but it is certainly far from being as hot as ordinary boiling water. This state of things is found on all high mountain tops, as the atmosphere grows weaker and its pressure less as one ascends.

A gentleman traveling at a great elevation in the Andes mountains put some potatoes in a pot of water over a hot fire. The water began to boil almost immediately, but the potatoes did not cook. All the afternoon and all night the water bubbled and boiled, but still the potatoes were not cooked. The boiling water was not hot enough.

Snails Live Indefinitely.

The Smithsonian Institution has hit upon something extraordinary in snails, says the *Washington correspondent of the Providence Journal*. The creatures may be slow, but they hold the record over all other animals for prolonged vitality under adverse conditions. Stories of toads dug out of rocks, in which they have been imprisoned for ages, are apocryphal; but recent discovery has established the credit of this humble mollusk as number one in tenacity of life. Only the other day a specimen from an island off the coast of California, inclosed in a drawer with part of the molluscan collection, was found to be alive. It had had no food or water for more than six years. When placed in a box with moist earth it protruded its foot and began to move about, and seemed to be as well as ever. Some time ago a few snails of a different species, gathered in Mexico, reached the Smithsonian Institution and were placed in a box. They remained undisturbed for two years and three months, at the end of which time they were put into a glass jar with some chickweed and a small quantity of tepid water. Pretty soon they waked up and appeared quite active.

How Old Is the Human Race?

The fullest answer that science can yet give to the three most interesting questions, perhaps, ever asked in the world is explained in an interesting article in the *December Forum*, by Daniel G. Brinton, the ethnologist. These questions are: "When did the

first man appear?" "By what process did he appear?" and "Where did he appear?" Summing up all that geologists and anthropologists know, he appeared certainly 50,000 years ago, and it may be as many as 200,000 years ago. The evidences of his existence which date back 50,000 years are unmistakable. By what process he came into being, science has no definite answer. If it refuse to accept the doctrine of specific creation, it must refuse also, for lack of complete evidence, to accept the doctrine of gradual evolution—the old Darwinian doctrine. Dr. Brinton thinks the theory of "evolution by a leap" is as good as any other theory. According to this, man sprung from some high order of mammal, the great tree-ape, perhaps, by a freak, just as men of genius are freaks, and as all the vegetable and animal kingdom show freaks. As to where man first appeared, it is beyond doubt that his earliest home was in Southern Europe, or Asia, or North Africa. No earlier traces of him have been found than those found in the area that is now England, France and Spain.

Plaster of Paris.

The method of testing the quality of plaster of Paris is by taking a small pinch of the powder between the thumb and finger and gently rubbing it; if small particles of grit are felt, it indicates that parts of the plaster have already absorbed water, and it is therefore unfit for use. The same test may be observed by taking a pinch of the powder again and placing the fingers under water, and then rubbing in the same way as before. If, however, in both of these tests no grit is felt, and under water a thin, creamy substance is formed, which is easily rubbed off the fingers, the plaster is in a proper condition for use. Where plaster has been kept for a long time, or where it is gritty, its condition can be very greatly improved. It may be redried by putting it in a metal dish, such as a pie plate or iron pot, and placing in an oven of a hot fire or over a gas jet. As soon as it becomes heated it will be observed that a process identical with boiling water is taking place. When the ebullition has entirely ceased, the powder is freshly kiln-dried. If the method of testing is again resorted to, it will be found that the gritty appearance and feeling will have disappeared, in a very large measure, leaving only the fine, dry powder ready for use. If there are any lumps remaining, they may be removed by the use of a sieve. From what has been already said, it will need be but a reminder that the plaster of Paris must always be kept in a hermetically sealed jar or in a very dry place.—*Charlotte Medical Journal*.

Electricity.

To Utilize the Bosphorus.

There is a certain Greek engineer, now resident in Europe, who ought to have been an American, for he is the author of just the kind of a scheme that, in the matter of boldness and picturesqueness, the world at large look to Yankee land to originate. At various points on the Bosphorus the current from the Black sea in the Mediterranean has prodigious force, and it is now proposed to harness some of this waste power for the lighting of the whole city of Constantinople and a considerable length of the adjacent coast by electricity. The way in which the inventor intends to turn the ocean currents in account is to erect three very powerful dynamo machines upon the three points of the Bosphorus where the current has the greatest force, and, so far as can at present be learned, the project seems to be practicable and realizable. It is stated that a company of capitalists has been formed, the necessary funds subscribed and application for concession addressed to the Turkish Government. It is understood that the Gov-

ernment has taken the project into consideration and nominated a commission to report on it.

Winding and Setting Tower Clocks.

The winding and setting of a good-sized tower clock of the time-honored pattern is by no means a small job, inasmuch as the raising of a ton or so of dead weight to the top of a high tower once a week is necessarily a work of time as well as labor. All this drudgery, it appears, is henceforth to be performed by the ubiquitous electric motor. A new clock recently placed in a building of the Waterbury Clock Co., Waterbury, Conn., is not more than one-fourth the weight of a tower clock of the ordinary type, having dials of equal diameter, and the whole machinery is operated by electric motors supplied with current from a sal-ammoniac battery of ten cells, which will run for a year or two without renewal. The great saving in actual power required to propel the clock largely results from the fact that the electric force is applied directly to the point where needed, without the intervention of the complex mechanism essential in weight clocks of the ordinary type.

An Inexpensive Electrical Machine.

Take a glass, expose it to the fire, so that it shall be perfectly dry, and place it upside down upon a table. Afterward, take a tray perfectly dry and place it upon the glass in such a way that it shall preserve its equilibrium. Finally, take a sheet of paper slightly smaller than the tray, heat it and rub it rapidly with a brush, and it will become quickly electrified. Then place it upon the tray. An electrical machine will thus have been constructed without any expense. If the finger be brought near the tray a spark will appear. This spark will be so much the brighter, and the series of sparks will be so much the longer, in proportion as the glass and trays are drier. If, while the sparks are being drawn from the tray, the room in which the experiment is performed is darkened, these sparks will appear extremely brilliant.—*Boston Journal of Commerce*.

Making Ozone.

An attempt is being made in London to produce ozone on such a scale that it will be available for innumerable hygienic and commercial purposes. The apparatus used is electrical, the ozonizer consisting of a number of serrated strips formed up into grids and separated from each other by plates of glass. On connecting these grids with opposite terminals of a high potential alternating current, what is called a "brush discharge" takes place on to the glass from the points of the serrations, and characteristic smell of ozone is quickly apparent. To make the ozone in still greater volume, a large number of these plates are so arranged in a suitable case that when the discharge is established, a current of air is passed through the apparatus, whence it emerges heavily charged with ozone. Before the air is passed into the ozonizer, it is filtered, cooled and dried, so that its purity is insured.

The Poor Man's Light.

Electricity will eventually provide the poor man's light, Mr. Peerce is reported to have said, and we think it a reasonable prophecy, says *Invention*. The management and control of the electric motor is simple; its service is in direct and immediate command; it requires no fuel; in economy of space occupied it has no competitor, and, in some cases, where needed for intermittent use, power can be furnished at one-tenth to one-fifth the cost of steam. An American contemporary points out that the electric motor has found its way into plumbing, metal spinning and machine shops in New York, and considers that there can be no grave doubt as to its more general adoption.

Hunting Lost Mines.

Hunting for lost mines seems to be a prominent industry at present. According to stories told by some old timers, one of these fabulously rich properties is supposed to exist somewhere within a few miles of Prescott, to the southwest of the town. The story, as told to the *Journal-Miner*, is to the effect that away back in the early 70's, "when Indians were had" in the country, a detachment of troops was sent out to camp on the old Indian trail running from Skull valley to Lynx creek, to guard the trail and to intercept a band of Indians that was expected to pass over it. The troops remained in camp for several days, and broke the monotony of camp life by prospecting for gold in the immediate vicinity. On their return to the post, it is said, that they brought in a lot of gold, which they obtained by grinding the ore between rocks. An officer was about to accompany some of the troops back to the spot for the purpose of locating some claims, when urgent marching orders were issued calling him with his troops out after the hostiles. When the campaign was over, he and his command were stationed at another post and never returned to Whipple again, although he wrote that he intended to again visit this section and hunt for the ledge from which his soldiers obtained this fabulously rich ore. Of course, intending to take advantage of their own find, they naturally kept it as quiet as possible, and but few of the then residents of the country knew of it. In later years, or about six or seven years ago, parties hearing of these circumstances went out and made a desultory investigation of a portion of the mountains in the neighborhood from which the ore was supposed to have been obtained, but nothing like a thorough prospecting of the country was had. There are a number of ledges in that section of the country, some of which have been partially prospected, but as yet nothing of any value has ever been obtained in any of them. A fortune may yet await the lucky discoverer of the ledge from which the soldiers obtained their rich ores.

Why Big Salaries Are Paid.

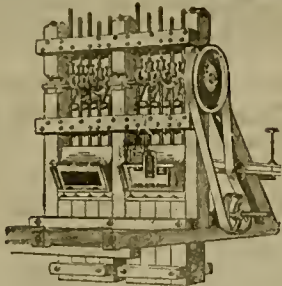
To the untechnical outsider the huge salaries paid nowadays by gold mining companies for efficient mine managers and consulting engineers must frequently appear unjustified, says the *London Mining Journal*. There is, however, no department of human activity in which the "two ways of doing it" produce more striking differences than the auriferous quartz treating industry. One has only to compare the cost of mining and millage at mines where adequate technical supervision has secured efficient machinery and proper methods, with others where a lower standard of skill is manifested, to fully appreciate this. Some of the gold mines in the United States are paying dividends upon ore ranging as low as 4 dwts. to the ton. The Treadwell mine, on Douglas Island, Alaska, is said to obtain gold more cheaply than any other in the world. It is very well situated for cheap working, as the mill is driven by water power, the mine is dry, and the ore has only to be quarried. Ships also can discharge within 400 yards of the mine. However, the ore is only 8 dwts. to the ton, and the profits obtained are mainly due to the employment of every possible labor-saving appliance. There are 240 heads of stamps at work, and the ore is extracted and milled at a cost of only 6s. per ton. Some of the mines under British management in Australia and elsewhere are not, however, inferior to the best-equipped American mines.

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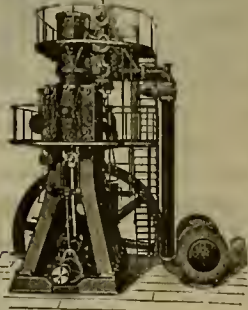
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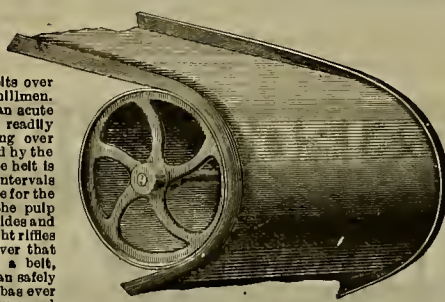
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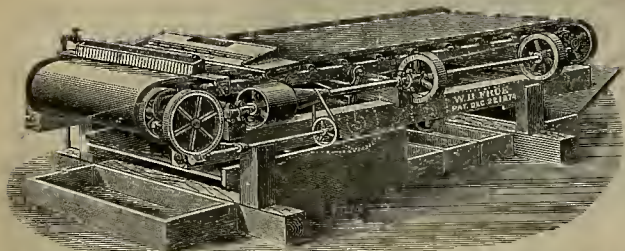
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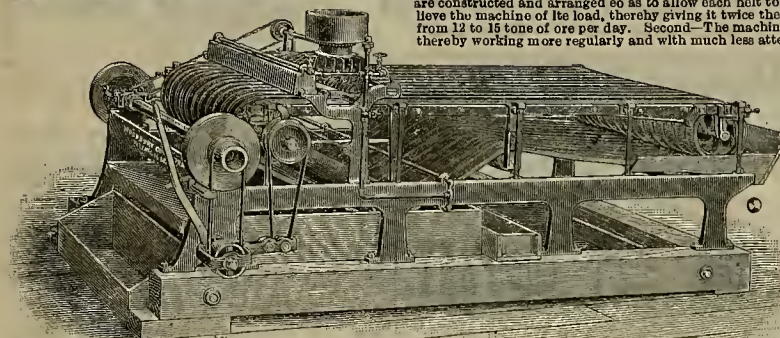
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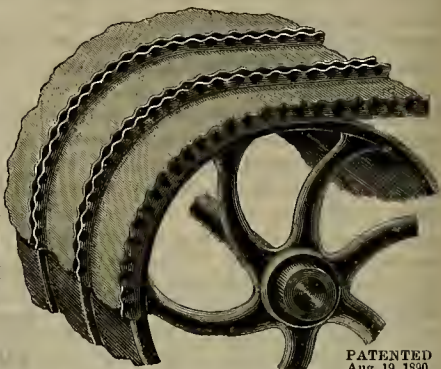
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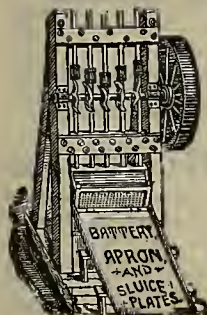
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Mining Summary.

The following is mostly condensed from journals published in the interior, in proximity to the mines mentioned.

CALIFORNIA.

Amador.

A NEW GRIFFIN MILL.—*Ledger*, March 29: Superintendent Hale of the Keystone has just ordered a Griffin mill which will be set up on that property in a few days. It is to be put in by the agents at their expense, to be paid for by the company, provided it comes up to their guarantee in efficiency.

Messrs. Thomas and Belshaw went up to the Gwynn mine Thursday from San Francisco, and this morning Messrs. Downe, Voorhies and Barney drove over from Sutter Creek and met them on the ground. Their business was to survey the property with relation to locating the shafts, buildings, etc.

The contractors at the Bay State mine are making good headway in the shaft. They have now reached a depth of 480 feet. The ground is in excellent condition for sinking, and strainers of quartz coming from the ledge are now being passed through. At the present rate of sinking, crosscutting to the ore body will be commenced by the first of May.

The Mayflower and the South Mayflower properties, near Amador, have added to their possessions the Amador mine, and they now own from Amador creek to Ranchera creek. Upon these properties there are five shafts, two of which are being sunk and two more in which work will be commenced in a few days. Several tunnels have been run into the hill and have been prospected much to the satisfaction of N. W. Crocker, the superintendent of the various properties. They are running ten stamps now, but as soon as the mill is repaired, twenty more will be added. Fifty men are employed upon the work now, but as development progress, many more will be put on.

Butte.

AT CHEROKEE.—*Oroville Mercury*: T. L. Vinton, the merchant of Cherokee, paid us a call to-day. In response to the query of "How is Cherokee?" he replied: "There is still a large quantity of gold being taken out of the Cherokee mine every day. It will average to my knowledge \$100 per day right along, and a great deal more is extracted by companies that I know nothing of. The men work the ground on percentage, paying for the privilege. The idea that Cherokee is entirely dead is a mistaken one. This amount of money coming from the ground every day keeps many families in prosperous circumstances."

Mr. Vinton is one of the firm believers in the great wealth of the Spring Valley mine and the future importance of Cherokee as a mining town. He is confident that within a few years, as soon as litigation is settled, the mine will be reopened by the drift system, and that Cherokee will be then one of the best mining towns in the State.

Calaveras.

THE MCFALL.—*Citizen*: The Ford Bros. are making quite a showing on their mine. They are down about 50 feet and the quartz looks very good. Quite a large percentage of sulphurets are to be found all through the rock, and we are informed that they carry considerable gold. The rock is getting somewhat softer, and more water is being encountered as they get deeper. Indications point to a good mine.

El Dorado.

VISITING MINES.—*Republican*, March 29: Col. Benyard and Major Heuer, of the California Debris Commissioners, accompanied by J. F. Kidder of Grass Valley, were in this county during the week, and visited the Snow mine at Newtown and a number of other hydraulic mines. The dam constructed by Snow Bros. to restrain debris was approved and a license issued for them to continue mining. In reference to the smaller mines in operation, the commissioners approve the selection of the sites for the restraining dams, but request that the obstructions to the flow of debris be raised higher, which is being done in compliance with the directions of the Commissioners.

Mariposa.

WITH A STRAM PLANT.—*Gazette*: The Ludwig mill will be in working order, as a steam plant, in a few days. Rock is being hauled from the Alarid mine, on the old ditch, to be tested as soon as the mill starts again.

Mono.

WATER SOURCE.—*Bodie Miner*: Paul Carroll and Pete Carroll are engaged in sluicing near the Dudley, and should water hold out they expect to make a few dollars. The scarcity of water this year practically knocks out what placer mining is usually carried on in this vicinity during the spring and summer.

Nevada.

THE WHITE DIAMOND.—*Transcript*: The work of putting up machinery at the White Diamond mine, about half a mile above North Bloomfield, was begun Wednesday. A five-foot ledge has been cut, and the quartz taken from it looks well. The shaft is down 75 feet. Bloomfield parties own the mine.

The Holiday quartz mine at Bloody Run, between Bloomfield and Moore's Flat, is being worked by Thomas Woon, Alex Dobbie, Jr., and W. Smith. The prospects are highly encouraging.

STROCK IR RICH.—*Transcript*: P. Norton, who has been working a quartz ledge this side of Lake City for a number of years, has struck it rich at last. The ledge is large and the quartz shows much free gold.

SALE OF A GRAVEL MINE.—*Herald*: Negotiations are about closed for the transfer of the

McKillican gravel property at Moore's Flat to the New York corporation who are to take a bond on it. It is a big deal. The New Yorkers are very wealthy men, and they propose to spend a large sum of money in developing this mine.

The mine is a big proposition. There is an immense deposit of gravel there known to carry gold in paying quantities. It would probably never be worked in any other way than by the drift process. Mining men believe that if the New Yorkers carry out their present plans they will have a mine which will rival the Derbec.

All this is good news for Moore's Flat and vicinity, and for Nevada City, for the matter of that. A number of men will be given work, and many thousands of dollars will be paid out for labor and supplies.

REPORTED SALE.—*Transcript*: It was reported in town Thursday, upon what appears to be good authority, that a sale of the Murchie mine property, of about 400 acres of patented ground, is about to be consummated. It is said that a company composed entirely of Scotchmen are to be the new owners.

STROCK OIL.—A dispatch from Carson, Nev., says: There will be another added to the resources of Mono county if the reported discovery of petroleum on the big island in Mono lake proves to be well founded. One hundred and sixty acres have been located by the following named persons: H. Boone, Judge Christian, Nat Boyd, Charles Radcliffe, James Patterson, Felix Deguirs, Pete Leonette and some other French-Canadians. They have formed a company and will develop the find to ascertain its extent. It is understood Boone will send for a boring machine at once.

The principal locators are Leonette and Deguine. They struck oil eight months ago, but did not bring in the petroleum until lately. They only received their naturalization papers this year. Some of the stuff brought in in a bottle resembles varnish, and some is in a crude state, of a dark greenish color. Both samples have been tested and found to be genuine petroleum. It has the coal oil smell and it also burns rapidly.

The strike has caused great excitement in and around Bodie, and it is stated that an effort will be made to interest Eastern capital, with a view to putting up refining works on a large scale if the flow holds out. As yet only meager particulars are obtainable. The amount of flow cannot now be stated, but it is reported to be sufficient to warrant development.

It is said the men were boring to strike water, and were surprised when they struck a flow of petroleum. There is no doubt about the genuineness of the discovery, however, and it is expected that the vicinity will be the scene of great activity in a few months.

THE OLD SEBASTOPOL.—*Union*: E. H. Baxter, principal owner of the Sebastopol, will shortly open up that mine and develop it. Negotiations are almost completed. An entire new hoisting and pumping plant will be placed on the mine and sinking commenced as soon as the water is forked. The Sebastopol is in a good locality. The mines now being developed on Osborne Hill are making good showings, and the old Sebastopol, years ago, under a crude system of mining, paid well.

A GOOD CLEANUP.—*Union*: The Wisconsin mine had a cleanup on Saturday of 167 loads of rock. The average outcome was \$60.57 per load, exclusive of sulphurets, which have a milling value of \$100 per ton. The company has on its dump, ready for milling, 60 loads more of the same rock, which will be crushed in the near future. The Wisconsin mine will prove a dividend-payer.

A NEW DEAL.—*Telegraph*: An arrangement was entered into between the Centennial Mining Company and Mr. H. Silvester, by means of which the company has been granted an extension of time for one year. This will enable the company to go ahead and thoroughly develop the mine, as all the preliminary work is done and the mine is free from water. The bottom drifts on the 650 level are being pushed ahead and there is a fine ledge visible in these drifts, as well as in the shaft. Mr. Larkin, president of the company, returned to Sacramento lately. All work at the mine will be vigorously prosecuted, and the best-posted miners in this district predict a rich strike in the near future.

Placer.

THE HIDDEN TREASURE.—*Republican*, March 30: Harold T. Power, of the Hidden Treasure mine at Sunny South, was in Auburn this week. Over 190 men are now employed in the mine, and the yield is very satisfactory. Mr. Power states that the past winter has been the most severe and most disagreeable he has ever experienced on the divide. Up to Tuesday last the road had not yet been opened to the mine for teams, and supplies were yet being taken in on sleds. It was expected, however, to have the road open by Wednesday.

San Bernardino.

AMONG THE CHLORIDERS.—*Vanderbilt Shaft*, March 30: Last Monday we took a stroll around to see the different chloriders in camp, and it was one of the pleasantest trips we have made lately. There is nothing more agreeable than to visit a man at his work when he is doing well and is full of hope; therefore, as there is not a discouraged chlorider in camp, it does a person good to talk to them.

Fox, Phillips and Freethy have a lease on the Bronze and are doing remarkably well. They work hard, have a good vein and their ore is rich, very rich. From one horning made recently the gold obtained weighed 25 cents.

Anderson and Makepeace have a lease on the Gore and are digging out good rock. Charlie McDonald also has a lease on this claim and is

doing well, his ore being very rich. Eddy and More have just taken a lease on this claim.

Marrs and Congdon, who have been working a lease on the Chippie for two months or more, and who have been doing well, are still taking out some very rich rock, a recent assay showing a value of about \$250. They have a lot of ore on the dump. Mr. Ewing commenced work Tuesday on a lease on this claim.

A short time ago I. Howell made a deal with A. G. Campbell by which Mr. Howell became owner of the Alta mining claim. Mr. Howell is now working this claim and has considerable fine ore on the dump. He will put some through the arrastra soon. Jim Orr is helping him in the mine.

John Alphin is looking for a good place to begin chloriding.

W. V. Trask and S. C. Spence are getting some good hornings out of the eight-inch vein on their lease on the Oversight. They are bound to make some money.

Kilpatrick and Grundy have a lease on the Monte and have sunk upon it a 35-foot shaft. They will now commence to drift. They have a good vein of ore and will do well.

E. D. Mulcahy has a 30-foot tunnel on the Iron claim. He is taking out ore now, having run his tunnel along the vein without disturbing the ore. He has a good showing.

Craig and Gordon have as good a body of ore as any chlorider in camp. They have a lease on the Webster, and their vein averages about eight inches in width, some of which runs very high, a recent assay showing a value of \$450. Juan Tapio took a lease on the Nugget about two months ago, and he is doing as well as any chlorider in camp.

Shasta.

DRIFT MINING.—*Redding Free Press*: The mining enterprise inaugurated some time ago by E. Parsons, deceased, on Oregon gulch, promises to result in something substantial to those interested. Mr. Parsons had made a study of geology, and had come to a positive conclusion regarding the existence of a prehistoric river which ran through this county before the advent of white men. The formation in Oregon gulch was of such a favorable character, in accordance with his ideas, that he organized a company and proceeded to sink a shaft. After going down vertically 40 feet he ran an incline shaft at an angle of about 30 degrees which is now 100 feet deep and has penetrated a sandstone formation and developed gravel containing gold, but hardly in paying quantities as yet.

The manager of the company, which is known as the Sacramento Pliocene Mining Company, is Dr. McLean of Sacramento. This week he shipped up a 20-horse power hoisting engine, with other necessary machinery, by the aid of which he hopes to facilitate the work, and he expects to strike an entirely different bed of gravel than that encountered and which is supposed to hold gold in such quantities as to pay the stockholders well. So far, Parson's theory has proven correct and good results are therefore expected.

Siskiyou.

RICH PAY.—*Yreka Journal*: The Greenhorn Blue Gravel Mining Company continue to take out rich pay every day, and the men employed are now running two tunnels from the hoisting and pumping shaft—one toward the hill, where such good pay was realized in the tunnel from the old shaft, and another toward Lee's house, where the good pay gravel was first discovered. This is likely to be an excellent season in working this claim, by reason of a greater amount of water than during most seasons to keep the sluices well supplied for washing the gold.

The quartz miners near the junction of Shasta and Klamath rivers are making preparations to commence work again as soon as the ground dries out, as it is too wet now for successful work. The water drips down in great quantity, and timber is scarce in the vicinity, with almost impassable roads for hauling by teams at present. This camp is called Fool's Paradise, but there is no foolishness about the existence of rich paying ledges, which will yield handsomely when well developed.

The Klamath river miners in Honolulu district have already commenced making preparations for putting in new wing dams, by getting out timbers and securing lumber for the purpose. They will be prepared for active operations as soon as the river reaches its normal level, and expect to realize good pay all summer until late in the fall. The heavy freshets during the past winter have cleared the stream of a great amount of tailings which covered good pay ground as an incumbrance, hence we may anticipate lively times all along the rich paying Klamath river from Hornbrook in the Cottonwood district down to the Virginia Bar, Honolulu, Oak Bar, Hamburg, Seiad Valley and Happy Camp districts, in this county. Good river diggings will also be worked with success on all the tributaries of the Klamath, especially the Salmon and Trinity rivers in Siskiyou, Humboldt and Trinity counties.

The miners in the high gulch diggings are getting ready for ground sluicing now that the snow is dissolving rapidly, but the snow is very deep yet for good progress, especially on the shady sides where the sun does not get much chance to melt it.

RICH LEAD.—*Journal*, April 4: Wiley Parker has located a rich ledge on Portuguese gulch, a tributary of Humburg gulch, west of Yreka, which carries free gold in nuggets and may develop into a large and valuable ledge. The croppings, however, are very thin, only 2½ inches wide, but this stringer may lead down to a wide ledge when tested in sinking a shaft. Besides the nuggets in the shaft, there is probably considerable fine gold.

The hydraulic miners in the Salmon river section are all busy with their giants in piping down the banks and are having excellent success in taking out gold dust. There is a greater

abundance of snow on the high mountain peaks than for several years which will keep up the water supply later than usual. The quartz mills are also grinding up rich quartz, with likelihood of water power to keep them going until fall.

Work has been commenced in the Campbell & Co. hydraulic mine in Quartz valley, the pay gravel being now raised to the surface by hydraulic elevators, in preference to drifting.

The Greenhorn blue gravel mine, a short distance south of Yreka, continues to pay about a dollar to each bucket hoisted, and as the claim is more thoroughly opened, double the number of buckets may be hoisted, to double the yield of gold.

Frank Hall, the well-known mining operator, is considering the matter of starting work again in the old Ballarat claim, on Yreka flats, north of Yreka, where good pay is believed to exist, the company working it never having gone down below the rimrock of the channel.

Eastlick & Lewia Brothers have a fine ledge of quartz at Oro Fino, which averages about three feet thick, and is eight feet thick in places. The quartz so far crushed has paid about \$10 a ton, with steady improvement.

The hydraulic claims at Oro Fino are in full blast, with an abundance of water to keep the quartz mills in operation until late in the summer.

William Shell, at New Pinery, in Scott valley, is taking out good pay, doing effective mining work by blasting with giant powder, and ground sluicing.

Tuolumne.

MOUNTAIN MINES.—*TO THE EDITOR*: The Louisiana mine is situated near Cherokee. It is a full claim of 1500 feet and is in granite formation. It has been opened by two shafts. The main shaft is down between 300 and 400 feet, and several levels run north and south on the vein. The ore is free-milling, with some sulphurets. Considerable gold has been taken out of this mine, which is now idle; and if reopened, would no doubt make a paying property. Water power can be had for the mill, hoists, etc.

The Laura mine, situated east of the Louisiana, is now working. The shaft has been sunk 200 feet, which makes it 400 feet, and they are now running drifts from the bottom. The hoisting works are a small upright boiler and engine; but when the mine is opened, and proves a success, water power will be used. A fall of about 500 feet can be had from the Soulsbyville ditch with about 4000 feet of pipe.

Col. J. L. Coles and brother, D. H., late of Montana, have bonded the Buckeye, Wooster and Mayflower mines, south of the Eureka Consolidated. They expect to commence operations in a short time.

Owing to the severity of the past winter, work was almost suspended on the Black Oak mine at Soulsbyville. The water has been pumped out of the mine again and a full force of men put to work. I am informed the vein in the bottom of the shaft is six or eight feet in width and is high-grade ore. There is a large percentage of sulphurets which go well up into the hundreds. The shaft is now a little over 600 feet in depth and is a fine property. There is a good hoist and mill on the property run by water obtained from the Tuolumne Water Company.

The Live Oak is south of and an extension of the Black Oak. It is owned by the same company. A ditch is now being made to the mine and the hoist will be run by water power. The Live Oak is a good property, and as soon as opened up again will pay a good dividend.

It is rumored that the Pennsylvania mine, south extension of the famous Soulsby, will be opened this summer. There is good ore in the Pennsylvania; and, as the Soulsby has been one of the best mines in the county, we have good reasons to think the Pennsylvania will be a valuable property.

The Carlotta mine at Cherokee is a good mine, but is now idle. Considerable gold has been taken out and the ore is of a high grade. Ore of a high grade has also been taken out of the Porto Fino, which joins the Carlotta. Good water power can be had, and mines can be opened with small capital.

The Seminole, which was bonded a few months ago by a San Francisco company, is now turning out good ore, and they have men grading out for a ten-stamp mill.

The Eureka Consolidated is working steadily and paying its men promptly. Twenty stamps are dropping day and night, which is good evidence that it is a prosperous paying property.

A ledge was lately discovered at Arrastraville by Cullers & Co. which shows gold. They have a few tons of ore out and it looks well.

Mr. J. E. Summers says he has discovered a new vein near the Mayflower which is two feet and shows gold freely.

April 3, 1894.

NEVADA.

Washoe District.

SUMMARY OF COMSTOCK OPERATIONS.—Following is a summary of the official reports for the past week from the Comstock mines:

Consolidated California & Virginia—1650 level.—The drift running north from the end of the crosscut run east from the drift run north from east crosscut No. 1 from the north drift from the winze—down 52 feet—has been extended during the week 19 feet; total length 69 feet, continuing in porphyry, clay and quartz of nominal value. Have extracted from our workings in the vicinity of the winze—down 20 feet—16 tons of ore assaying \$47 per ton. We are doing some necessary repair work in the main south drift and openings therefrom on the 1600 level. 1000 level.—The Rule drift—From the upraise from this drift, started at a point 353 feet south of the shaft—60 feet up—an east crosscut has been started and advanced 20 feet; in porphyry and clay formation. At a point 50 feet up in this

upraise a north drift has been started and advanced 25 feet; in a porphyry formation. East crosscut No. 2, started from the drift at a point 527 feet from the shaft station, has been extended 30 feet; total length, 115 feet; face in porphyry, clay and quartz of low assay value. Opposite this east crosscut a west crosscut has been advanced 15 feet in vein material, showing quartz of a low assay value.

Ophir—1465 level.—The crosscut running west from the drift run north from the crosscut run west from the main north drift on the sill floor of this level at a point 124 feet south from the winze station has been extended during the week 12 feet; total length 60 feet; continuing in porphyry showing clay separations. Central tunnel.—The north drift from the main west drift has been reopened and repaired 84 feet; total length 142 feet. Have continued, jointly with the Mexican Company, the work of making repairs to the main shaft.

Mexican—1465 level.—The upraise started near the mouth of the crosscut run west from the drift run south from the top of the upraise which was carried up 45 feet above the sill floor of this level at a point 40 feet from the main north drift and 100 feet north from the south line of the mine has been carried up during the week 11 feet; total height 51 feet; formation hard porphyry.

Union Mine—900 level.—The Union Con. and Sierra Nevada joint east crosscut near the north line of the Union mine started from joint north drift, which was run from the joint west drift at a point 1520 feet west of shaft, has been extended during the week 21 feet; total length, 191 feet; face in clay and porphyry.

Andes—420 level.—West crosscut No. 3 has been extended 17 feet; total length 124 feet; formation hard porphyry.

Best & Belcher—900 level.—The east crosscut which is being run on the north boundary has been advanced 18 feet during the week; total length, 449 feet; face in soft porphyry and seams of clay.

Gould & Curry—200 level.—West crosscut No. 5 started in northwest drift 432 feet from the main west drift has been extended 18 feet; total length 975 feet; face in hard porphyry.

Hale & Norcross—900 level.—Advanced the south drift 10 feet; total length, 157 feet; face in porphyry. 1100 level.—Advanced the south drift 13 feet; total length 155 feet; face in porphyry.

Sierra Nevada.—The south lateral drift from the intermediate tunnel has been advanced 28 feet; total length, 543 feet; face in clay and porphyry. The joint east crosscut near north line, from the north drift 1520 feet west of the shaft, 900 level, has been advanced 24 feet; total length, 191 feet; face in clay and porphyry.

Chollar.—The north drift, 100 level, is now out 80 feet; the face is in low-grade quartz. The west drift, 300 feet south of north line, 100 level, is out 50 feet; face is in porphyry.

Potosi.—The south drift on the 450 level has been advanced 20 feet; total length, 272 feet; face in porphyry and streaks of quartz. The raise from the northwest drift, 450 level, is up 58 feet; top in low-grade quartz and porphyry.

Ballion.—The west drift from the station, 820 level, Ward shaft, is out 675 feet from the shaft; face in porphyry.

BLANKET SLICING UNPROFITABLE.—*Enterprise.* The owners of the blanket slicers in Six-mile Canyon find it very difficult to make expenses on account of the tailings escaping into the creek from the Nevada mill containing only a small percentage of sulphurets, and this, coupled with the low price of silver, has reduced the margin above expenses to a minimum.

From 1879 to 1880 blanket slicing in the canyon was very profitable. During those years there were twelve stamp mills in operation, the tailings from which flowed into Six-mile Canyon creek, which at that time was almost a solid floor of slicings from the Nevada mill to the mouth of the canyon.

The large percentage of metal mingling with the creek water colored it blue as steel, and a bucket of the material dipped from the stream at any point showed an average assay value of from \$3 to \$4 per ton in the sediment at the bottom. When the flow was concentrated on the blanket-covered tables the sulphurets showed an average value of about \$30 per ton, and the owner of two strings of blanket slicers west of Flowsy, and a plant of two amalgamating pans, cleared from \$500 to \$800 monthly for several years.

Several owners of blanket slicers have concluded to abandon sweeping this summer, and will put strings of placer flumes in the creek to prospect the ground down to the bedrock, where coarse gold is frequently found, but so far, not in quantities sufficient to pay. That found, however, is rough and jagged on the edges, indicating that it has not traveled far, and the chances are favorable for finding gold-bearing quartz seams in paying quantities in the bedrock.

Kennedy District.

THE MILL A SUCCESS.—*Silver State.* The mill at Kennedy, under the able supervision of John Ross, Jr., started up last week and is working like a daisy. The yellow metal will be turned out lively now and the only drawback will be the capacity of the mill, as the camp is full of good ore and the mill is not large. Kennedy will no doubt be a booming place this summer, and great credit is due Mr. Jenkins for his pluck and confidence.

ARIZONA.

A DOS CABEZAS PRODUCT.—The property of the Cochise County Marble and Onyx Co., which is located in Dos Cabezas district, about eight miles from the town of that name, has come into prominence. The Phoenix Republican says Secretary Coon has just received some of the polished stone which had been

sent to Tennessee. It attracts much attention. The samples are accompanied by a letter from Mr. John L. Hart, secretary of the East Tennessee Marble Co., a gentleman so regarded as an expert that he was summoned before the Ways and Means Committee during its deliberation upon the marble schedule of the Wilson bill.

Mr. Hart writes that the marble is of the highest grade and that the samples sent represent only about one-third of the variety forwarded from the quarry for polishing.

The stock of the company is owned by Tennessee marble quarry men.

FINR SHOWING.—*Mojave Miner.* The showing in the Buckeye mine is said to be far ahead of anything ever seen in the Rural in its balmy days. The ore is very high grade and the bunches of solid native silver are immense.

The Gold Mining Company of Music mountain has, at a small estimate, \$25,000 worth of ore blocked out in the mine and on the dump. The ore will average fully forty dollars in free gold.

John Smithline, who has been at work on the Lucky Boy mine, on the west side of Sherman's Peak, assorted about five tons of ore and brought it into the sampler this week. The ore will average about 350 ounces in silver per ton. He has a splendid showing of silver ore in the mine and will do much more development on the property when he returns home.

The main shaft on the Tennessee mine at Chloride is now down seventy feet and still going down. Owing to the large volume of water encountered, a steam pump and hoist will have to be put in. The shaft has been securely timbered and the loose ground that was found so troublesome a few weeks ago has been caught up securely. The shaft is all in ore of a good grade.

TROUBLE AT THE CONGRESS.—*Tombstone Prospector.* April 2: It is reported that serious trouble has been caused at the Congress mine by the appearance of 18 Italians, who have been put to work in the mine. A large number of American miners appeared there for work and demanded that the Italians be discharged, threatening the life of the foreman unless their request was complied with. Matters were in this condition when our informant left.

IDAHO.

BUNKER HILL AND SULLIVAN.—*Wardner News.* Work in the Bunker Hill and Sullivan mines proceeds with accustomed regularity, and the new electric hoist, which was put in operation on Monday, is working most satisfactorily. New wire rope has arrived this week from the Trenton Iron Works, New Jersey, and will be placed on the line between the Reed ore bin and the first snow shed.

MONTANA.

BIO MINING SALE.—*Helena Independent.* The biggest mining deal made in this State in a long while is the sale of the Golden Sunlight group of mines, in Jefferson county, near Whitehall, to a New York syndicate for \$500,000. The first payment on the purchase has been made. A few days after the sale of the Golden Sunlight group came the news of the sale of the Poorman mine in the Coeur d'Alene country to an English syndicate for half a million. These two sales for such large sums, coming so close together, indicate that capital is ready to go into mining where there is something in sight to justify an investment. They also show that capitalists regard legitimate mining enterprises as good investments which will return a good interest on the money put into them. The good effects of the sale of the Golden Sunlight group are already felt in the neighborhood in which the mines are located, reports from there being to the effect that many properties that have lain idle for a long time are going to be developed this season, and that prospectors are only waiting for the snow to go off in order to start out into the hills.

OREGON.

RICH POCKET.—*Jacksonville Times.* Messrs. Knott, Swinden and Birdsey have struck a rich pocket in their mine in Kane creek district.

E. K. Anderson and Crit Tolman are pushing work on their quartz mill in Wagner creek district, and are nearly ready to commence crushing ore.

Dr. Taylor & Co., who have the Rummel & Legate quartz mines at the head of Rider gulch, near Henley, Cal., bonded, have put a force of men to work on them.

B. F. Dunphy of Portland is prospecting the Miller Hydraulic mine on Farmer's flat, with a view to purchasing the same. A price has been agreed on for the property under certain conditions; but no sale has been consummated or bond given as yet. This is one of the best placer mines in southern Oregon, and should bring a good price.

Carter Bros. are extensively engaged in mining on the old Kilgore place in Ashland precinct, with good prospects of a big cleanup. They have 1300 feet of hydraulic pipe, and having the use of several miles of new ditch from Wagner creek, will wash a good deal of ground during the season. Messrs. Carter are full of energy and have been interested in a number of mining enterprises.

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Market Reports.

The Markets.

SAN FRANCISCO, April 5, 1894.

The silver market has shown decided improvement during the week. The veto of the Seigniorage bill relieved the tension, and had a directly contrary effect to what might have been expected during the week—if it had any effect at all. The improvement is in part due no doubt to a growing confidence that European nations must make a positive movement toward the rehabilitation of silver. The indications are now more favorable than they have been for some time.

After steady improvement for a week in silver, prices receded to-day, the New York price being 61 1/2¢; London, 27 1/2¢.

There are no important changes in copper and lead.

Coinage in March.

The coinage of the San Francisco Mint in March was as follows:

Descriptions.	Amount.
Double Eagles.....	\$1,250,000
Eagles.....	250,000
Half Dollars.....	269,948
Quarter Dollars.....	90,000

Total.....	\$1,859,948
January.....	2,500,000
February.....	2,380,000

Three months.....	\$5,799,948
Same time in 1893.....	7,890,000

Decrease in 1894..... \$590,052

The total for the same time in 1892 was \$7,036,189, against \$11,173,536 in 1891.

The total coinage during the first nine months of 1893-94 was \$18,051,288, against \$18,603,121 for the same time in 1892-93.

New York Prices.

NEW YORK, April 5.—Following are the closing prices for the week:

	Silver in	Copper.	Lead.	Tin.
Thursday.....	27 1/2	59 3/4	9 50	3 40
Friday.....	27 1/2	59 3/4	9 50	3 40
Saturday.....	27 1/2	60 1/4	9 50	3 40
Monday.....	28 1/4	61 1/4	9 50	3 40
Tuesday.....	28 1/4	62 1/4	9 50	3 40
Wednesday.....	29 1/4	63 1/4	9 50	3 40

San Francisco Metal and Coal Market.

Per lb.	QUICKSILVER.	STEEL.	IRON.
Refined, in car lots.....	71	20	22
Powdered, do.....	71	20	22
Concentrated, do.....	71	20	22
All grades jobbing at advance.....	71	20	22
COPPER.....	23	20	22
Bolt.....	23	20	22
Sheeting.....	23	20	22
Ingot, jobbing.....	23	20	22
Do, wholesale.....	23	20	22
IRON.....	23	20	22
Bar, heavy.....	23	20	22
Norway, heavy.....	23	20	22
Pig iron.....	23	20	22
Eglington 10 ton.....	23	20	22
Oregonian.....	23	20	22
Am. Soft No. 1.....	23	20	22
Am. Soft No. 2.....	23	20	22
Puget Sound.....	23	20	22
Olay Lake White.....	23	20	22
Langdon.....	23	20	22
Cartier.....	23	20	22
Barrow.....	23	20	22
Cargodet.....	23	20	22
Pig.....	23	20	22
Bar.....	23	20	22
Sheet.....	23	20	22
Pipe.....	23	20	22
Drop, sizes smaller than B.....	23	20	22
Do, B and larger sizes.....	23	20	22
Brok. Balls and Chilled.....	23	20	22
do, 1/2 bag of 25 lbs.....	23	20	22
do, 1/2 bag of 25 lbs.....	23	20	22

Mining Share Market.

SAN FRANCISCO, April 5, 1894.

The Comstock market has during the week been more healthy than the week before. The feature of the week has been that Opbir is at the head of the list, passing Con. Cal. & Virginia. During this forenoon it sold up to \$3, the highest price it has touched for two months. Con. Cal. & Virginia had to play second fiddle. The cause of Opbir's advance is the resumption of exploratory work in the surface ground in the western part of the mine, through the old Central tunnel and its branches. In a few days a connection will be made between the north drift from the tunnel and the old Mexican shaft, and after that some crosscutting in interesting places will begin. Gold rock giving fair assays has already been found in the drift.

In the middle group of stocks this morning a steady advance in Potosi right in the face of the 25-cent assessment, which will be delinquent to-morrow, greatly encouraged the others, and there were large purchases of Chollar, Bullion, Savage and Hale & Norcross at higher prices.

Below is a statement of the sums disbursed to employees of Comstock mining companies for services during month of March: Hale & Norcross, \$2194.25; Con. California & Virginia, \$8783; Opbir, \$2695.25; Mexican, \$2299.25; Keniluck, \$894; Bst & Belcher, \$2119.50; Gould & Curry, \$1338; G. & C. and B. & B. shaft, \$124; Alta, \$1966.50; Occidental, \$737; Justice, \$1199; Crown Point, \$2382; Yellow Jacket, \$3014; Belcher, \$2514; Seg. Belcher, \$671; Scorpion, \$3004; Savage, \$3700; Chollar, \$3757; Potosi, \$3465; Union shaft, \$2113.50; Alpha and Exchequer, \$603; Ward shaft and Bullion, \$7448; Sierra Nevada, \$4445; Nevada mill (estimated), \$2500; water company (estimated), \$3000; quartz mills (estimated), \$7000; total, \$62,602.75. The pay rolls aggregate \$606.75 more in March than in February.

It is reported on the Comstock that the Gold Hill Miners' Union will meet in a few days and take another vote on the wages question. A large majority of the members are understood to favor a reduction in wages from \$4 to \$3 per day.

Coast Industrial Notes.

—The wages of the Benicia tanners have been cut 10 to 20 per cent.

—Owing to the rise in the Columbia, half of the 600 men employed on the canal and locks at Cascades were discharged Saturday.

—The daily capacity of the eighteen shingle mills in British Columbia is 1,380,000 shingles, and a kiln capacity of 985,000.

—A factory is to be started at Grant, Or., to make a new kind of plow invented by a man living across the river to Klickitat county.

—The railroad company has in course of construction at Sacramento a portable plant for treating ties with a preservative compound.

—The Banning Herald professes to have information that a natural gas well with a strong flow has been struck by persons boring a well in Los Angeles.

—The Arizona Land Court has decided that land grants made by the Mexican States are void. This affects the titles of grants aggregating nearly 75,000 acres.

—At Stockton the Union Flouring Mill is to be taken into the mill combine. Stockton people think this will result in the consolidation of the competing steamer lines, or the raising of passenger and freight rates, or both.

—The United States Court of Private Land Claims, which has been in session at Tucson, A. T., for some days, has adjourned after handing down a decision in the Sonita, San Rafael del Valle, Babacomari and Nogales de Elias grant cases, favoring the settlers.

—The snowfall in the Cascade mountains this winter has been enormous along the Great Northern road. Up to a week ago it had been 63 feet 7 inches on the summit, and after settling it lay 26 feet 3 deep on the level, being above the tops of the telegraph poles.

—The Census Bureau furnishes the following statistics for the Pacific coast concerning the total value of real and personal property. The totals are as follows: California, \$2,533,733,627; Oregon, \$590,396,194; Washington, \$760,698,726; Nevada, \$180,323,668; Utah, \$349,411,234; Arizona, \$188,880,976; New Mexico, \$231,459,857. The same figures for California in 1880 were \$1,343,000,000.

—Vallejo's electric light works were sold at auction Tuesday to satisfy a claim of \$10,000. There were scarcely any outside bidders present, and Sheriff Henderson was forced to knock the works down to ex-Senator James McCudden for \$2800. Since the sale there has arisen a rumor that the Court will not confirm the sale, as there are reports of collusion. Since the inauguration of the Vallejo electric light works the company has been involved in many legal tangles. For the past two weeks the works have been shut down, leaving Vallejo in total darkness and many residences without light.

—The Market-street officials are figuring on the construction and equipment of an immense power-house at the corner of Channel and Bryant streets, which shall be of sufficient capacity to run all the various lines of road which it is contemplated to operate by electricity in the city. At first the boiler capacity, it is estimated, will approximate 1500 to 1800-horse power, but it is proposed to provide for a possible increase of these figures 6000 or 7000 in a few years. The Howard-street line, the South San Francisco and the Third, Fourth and Fifth-street lines will, it is contemplated, be operated by electricity before many months, and the Mission-street line, it is anticipated, will be in working order some time in June.

Electrical Transmission of Power.

We desire to direct the attention of Mine Owners, and others, to the subject of Long Distance Transmission of Power, by means of electricity.

The successful operation of these plants means much to the mining interests of this State where fuel is high, for the utilization of the water power of the State will make low-grade ore pay handsomely. The saving to be effected by electric power transmission has been demonstrated at Bodie, Cal., where the Standard Mine Co. installed a plant for transmitting 150 H. P. a distance of 12 miles. In his report to the stockholders, dated February 20, 1893, the president says:

"In 1891 we expended \$21,607.75 for mill fuel, or an average of \$1780 per month. In 1892 the expenditure for the same was \$22,758.30, or an average of \$1896.52 per month."

This entire expense is now being saved, and with no more attention than with the steam plant. The saving effected will pay the entire cost of the installation in less than two years.

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COMPANY AND LOCATION.		ASSESSMENTS.		NO. AMT. LEVIED, DELINQ AND SALE.		SECRETARY.	
Andes M Co, Nevada.....	40.....	25c.....	Mar 6, April 10, April 23.....	John W Twigg, Nevada Block			
Belcher M Co, Nevada.....	48.....	25c.....	Mar 13, April 17, May 8.....	O L Perkins, Mills Bld'g			
Bodie Cons M Co, California.....	17.....	15c.....	Mar 10, April 16, May 14.....	M E Willis, 414 California			
California G M Co, South Dakota.....	18.....	50c.....	Mar 8, April 10, May 10.....	D L Dray, Mills Bld'g			
Callegos Cons M Co, Nev.....	10.....	5c.....	April 5, May 3, May 23.....	O L McOoy, Mills Bld'g			
Chollar M Co, Nevada.....	33.....	25c.....	Mar 21, Apr 21, May 15.....	Chas E Elliot, New Block			
Con Cal & Va M Co, Nevada.....	4.....	50c.....	Mar 6, April 10, April 23.....	A W Havens, Nevada Block			
East Sierra Nevada M Co, Nevada.....	3.....	5c.....	Jan 10, April 20, May 11.....	Oso R Bpney, 310 Pine			
Evening Star M Co, Cal.....	13.....	11c.....	March 27, May 3, May 24.....	J Sootile, 320 Sansome			
Evening Star M Co, Cal.....	1.....	1c.....	March 8, April 16, May 4.....	M O Leulier, 137 Montgomery			
Jackrabbit M & M Co, California.....	6.....	2c.....	Mar 22, Apr 24, May 11.....	J F Holling, Crocker Bld'g			
Martin White M Co, Nev.....	29.....	25c.....	Jan 13, Feb 24, Mar 31.....	K L Ross, Sup Court Bldg			
Osborn Hill M Co, Cal.....	2.....	25c.....	April 2, May 7, May 25.....	R R Grayson, 331 Pine			
Overman M Co, Nevada.....	10.....	10c.....	Mar 6, April 10, April 30.....	C D Edwards, 414 California			
Potosi M Co, Nevada.....	41.....	25c.....	Mar 6, April 15, May 2.....	Chas E Elliot, N vaia Block			
Savage M Co, Nevada.....	83.....	25c.....	Mar 5, April 9, April 30.....	E B Holmes, Nevada Block			
Scorpion M Co, Nevada.....	5.....	5c.....	Jan 10, April 13, May 4.....	Geo H Spiney, 310 Pine			
Sierrita Cons Quicksilver Co, California.....	8.....	7c.....	Mar 2, April 5, April 27.....	Edw F Stone, 306 Pine			
Teresa Mining Co, Mexico.....	15.....	5c.....	Feb 16, Mar 23, Apr 10.....	K J Willard, Flood Bld'g			
MEETINGS.							
COMPANY AND LOCATION.		MEETING. SECRETARY AND OFFICE IN S. F.				DATE.	
Butler Cons M Co, Nevada.....	Annual.....	L Osborn, Nevada Block.....				April 10	
Champion M Co, California.....	Annual.....	J F Holling, Crocker Bld'g.....				April 10	
Dorr Creek M Co, Cal.....	Special.....	A W Robinson, 26 Montgomery.....				April 11	
Hudson Hay Cons G M Co.....	Annual.....	J H Sayre, 323 Montgomery.....				April 11	

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List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey & Co.,* Pioneer Patent Solicitors for Pacific Coast.

FOR WEEK ENDING MARCH 27, 1894.
517,206.—TRACT HARROW—H. Baker, Santa Rosa, Cal.
517,183.—WINDOW SCREEN—C. H. Bartlett, Jr., Pomona, Cal.
517,021.—HAME AND COLLAR—D. K. Bill, Hillsborough, Oregon.
517,041.—FRUIT PICKER—W. H. Haw, Fields Landing, Cal.
517,219.—TRACT—E. Hickman, Red Bluff, Cal.
517,118.—BUBBLER BLOWER—P. D. Horton, Oakland, Cal.
517,223.—CANE—John Lee, San Mateo, Cal.
517,380.—CAR COUPLING—J. D. Locke, Cosumne, Cal.
517,412.—DELIVERING OODS—A. F. Martel, S. F.
5,791.—ADOINO MACHINE—W. K. Nichols, S. F.
517,192.—HOB COUPLING—J. M. Prior, Carson, Nev.
517,362.—STUMP EXTRACTOR—G. B. Pulley, Clovis, Or.
517,194.—TRUSS—C. B. Roethel, Jacksonville, Or.
517,243.—TELEPHONE SYSTEM—Salis & Hampton, S. F.
517,305.—DISCHARGE FOR CANS—A. H. & T. A. Schriener, Oakland, Cal.
517,365.—HARROW—S. Shoemaker, Shasta, Cal.

NOTE.—Copies of U. S. and Foreign patents furnished by Dewey & Co. in the shortest time possible (by mail for telegraphic order). American and Foreign patents obtained, and general patent business for Pacific Coast Inventors transacted with perfect security, at reasonable rates, and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

TRACT HARROW.—Henry Baker, Santa Rosa, Cal., assignor of one-half to George E. Guerne of same place. No. 517,206. Dated March 27, 1894. This harrow, as its name implies, is especially adapted for use on race tracks, to which it is particularly applicable by reason of the mounting of its teeth and the adjustability of its frame, making it possible to be readily set and conveniently and effectively used in preparing and dressing the surface of the course. The harrow is composed of a tooth-carrying frame, supported at its rear upon a rocking axle which has end cranks upon which the wheels are mounted. A swinging clevis at the front of the frame carries the front wheel, and this clevis is connected by a rod with the lever which rocks the crank axle, thereby vertically adjusting both ends of the frame simultaneously. The teeth are secured in sockets in the outer sides of the bars by plate bolts to said bars. By loosening a plate near a tooth the latter may be raised or lowered or removed for the substitution of another. Thus the required uniformity of adjustment necessary for the particular use of track harrowing can be easily and accurately effected.

TRUSS.—Carl C. Rostel, Jacksonville, Or. No. 517,194. Dated March 27, 1894. The object of this invention is to provide an elastic-truss belt, which is adjustable in length to suit the size of the person, for the purpose of placing the pad or pads at the proper point without altering their position upon the belt; to provide a pad or pads with an elastic pressure device, the tension of which is adjustable to any part of the pad, and to any degree of strength; and to provide certain relieving pads to prevent soreness at points where the belt passes around the pad. The whole invention is designed as an improvement in that class of apparatus which is employed for the treatment of beria.

SELF-REGULATING DISCHARGE FOR CLOSED VESSELS.—A. H. & T. A. Schleuter, Oakland, Cal. No. 517,305. This invention relates to a discharging apparatus for closed vessels of any kind contain-

ing liquids. The object is to provide a means for allowing liquid to flow from an air-tight vessel whenever the discharge passage is open, and for arresting the flow from said passage whenever the receptacle has been filled to the proper height, and to prevent the overflow of the receptacle. With this apparatus it may be effected with any hermetically closed vessel, cask or other containing device.

Board Sales of Mining Stocks.

S. F. Stock Board.

THURSDAY, April 6, 1894.

9:30 A. M. SESSION.

600 Alta.....	32c	200 Justice.....	14c
200 Andes.....	13c	750 Mexican.....	15c
100.....	20c	10.....	14c
100 Belcher.....	76c	210 Opbir.....	27c
400 B & B.....	15c	500 Overman.....	14c
100.....	15c	100.....	15c
100 Bullion.....	37c	500 Occidental.....	14c
100.....	38c	300 Potosi.....	84c
200.....	39c	100.....	85c
720 C & V.....	24c	500 Savage.....	60c
30.....	25c	150 Sierra Nev.....	11c
200 Chollar.....	33c	150.....	11c
150 Crown Point.....	59c	400 Seg Belcher.....	15c
250.....	60c	550 Union.....	79c
200 Exchequer.....	51c	500.....	80c
60 G & O.....	77c	300 Yellow Jacket.....	68c

2:30 P. M. SESSION.

100 Alta.....	20c	350 Keotuck.....	9c
200.....	21c	100.....	10c
400 Andes.....	24c	350 Mexican.....	15c
250 Belcher.....	79c	100 Occidental.....	13c
600 Best & Belcher.....	16c	350 Opbir.....	19c
200 Challenge.....	75c	500 Overman.....	14c
100 Chollar.....	32c	100.....	15c
600 Con. Cal. & Va.....	25c	350 Overman.....	15c
30.....	25c	100 Potosi.....	85c
200.....	26c	500 Savage.....	87c
50 Crown Point.....	60c	500.....	88c
400.....	62c	500 Scorpion.....	90c
25.....	60c	500 Sierra Nevada.....	90c
500 Confidence.....	15c	200 S. Belcher.....	15c
400 G & O.....	75c	250 Sierra Nevada.....	12c
700 H & N.....	62c	550 Union.....	85c
500 Iowa.....	70c	300 Utah.....	6c
500 Justice.....	14c	300 Yellow Jacket.....	70c
200.....	15c		

Assessment Notices.

SUPERIOR MILL AND MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Placerville, El Dorado County, California.

Notice is hereby given that at a meeting of the Board of Directors held on the 13th day of March, 1894, an assessment (No. 1) of Twenty Cents per share was levied upon the capital stock of the corporation, payable immediately in United States Gold coin, to the Secretary at the office of the company, Room 17, 318 Pine street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 23d day of April, 1894, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 14th day of May, 1894, to pay the delinquent assessment, together with the cost of advertising and expenses of sale. By order of the Board of Directors.

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{ Secretary and Manager. }

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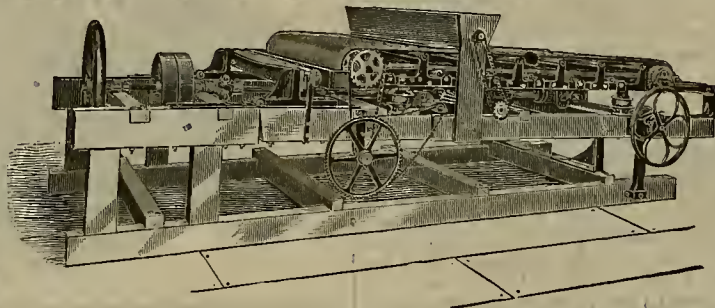
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Samples of pulp and tailings, taken every hour, dried, mixed and assayed, show * * * from West ledge, a saving by your concentrator of 94½ per cent; from East ledge, * * * a saving of 32 per cent.

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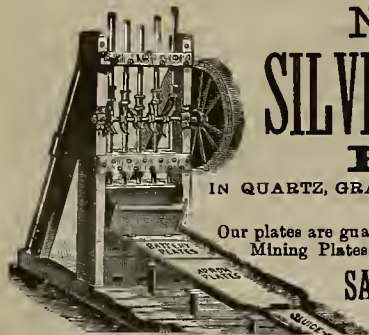
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MINING AND SCIENTIFIC PRESS, 220 Market St., San Francisco.

MINING AND SCIENTIFIC PRESS.

An Illustrated Journal of Mining, Mechanics and Popular Science.

VOLUME LXVIII.
Number 15

SAN FRANCISCO, SATURDAY, APRIL 14, 1894.

Three Dollars per Annum.
SINGLE COPIES, 10 CENTS.

A 1000-Horse Power Two-Phase Alternator.

The illustration on this page is most interesting as furnishing in some degree an idea of the tremendous development of electric power and electric power appliances during the past few years. It is the two-phase alternating generator, 750 kilowatt, shown at the Columbian Exposition by the Westinghouse Electric & Manufacturing Company of Pittsburg. It has 1000-horse power.

All alternating current generators (usually known as alternators) must have the magnetism of their fields excited by a direct current. As distinguished by the source from which this exciting current is obtained there are three classes:

1st. Separately excited alternators, which derive the excitation of their fields entirely from a separate dynamo, called an "exciter."

2d. Composite wound alternators, which receive a part of their exciting current from a separate exciter and a part from their own armatures.

3d. Self-excited alternators, which have their entire field current supplied from their own armatures.

Alternators usually deliver current at higher potentials than are allowable in direct current machines adapted to incandescent lighting. Economical distribution of electrical energy over long distances requires the use of high pressure, but this is practicable only in alternating-current systems, which, while employing very high potentials in the distributing circuits, are able to supply low potentials to the lamps by means of the transformer. The alternator itself possesses a great advantage over the direct current dynamo in the fact that its current is delivered to the circuit through ring collectors and not through commutators, which are exceedingly troublesome where the attempt is made to employ high potentials.

Alternators derive their name from the fact that the current which they deliver is reversed in the direction of its flow many thousand times a minute. It is evident, therefore, they can have no continuously positive (+) or negative (-) brushes.

There are several types of two-phase alternating current generators, among which two are especially prominent. Machines of the first type are really double machines, having two fields and two armatures—the latter mounted on the same shaft. Each armature delivers alternating current to a two-wire circuit, and these circuits taken together constitute the four-wire circuit of the generator, or

they may be so connected as to constitute a three-wire circuit.

Machines of the second type have single armatures with two windings, or with a single winding so connected to the ring collectors as to deliver two currents differing in their time relation or phase. In place of the commutators ring collectors are used, but in other respects the construction is not materially modified.

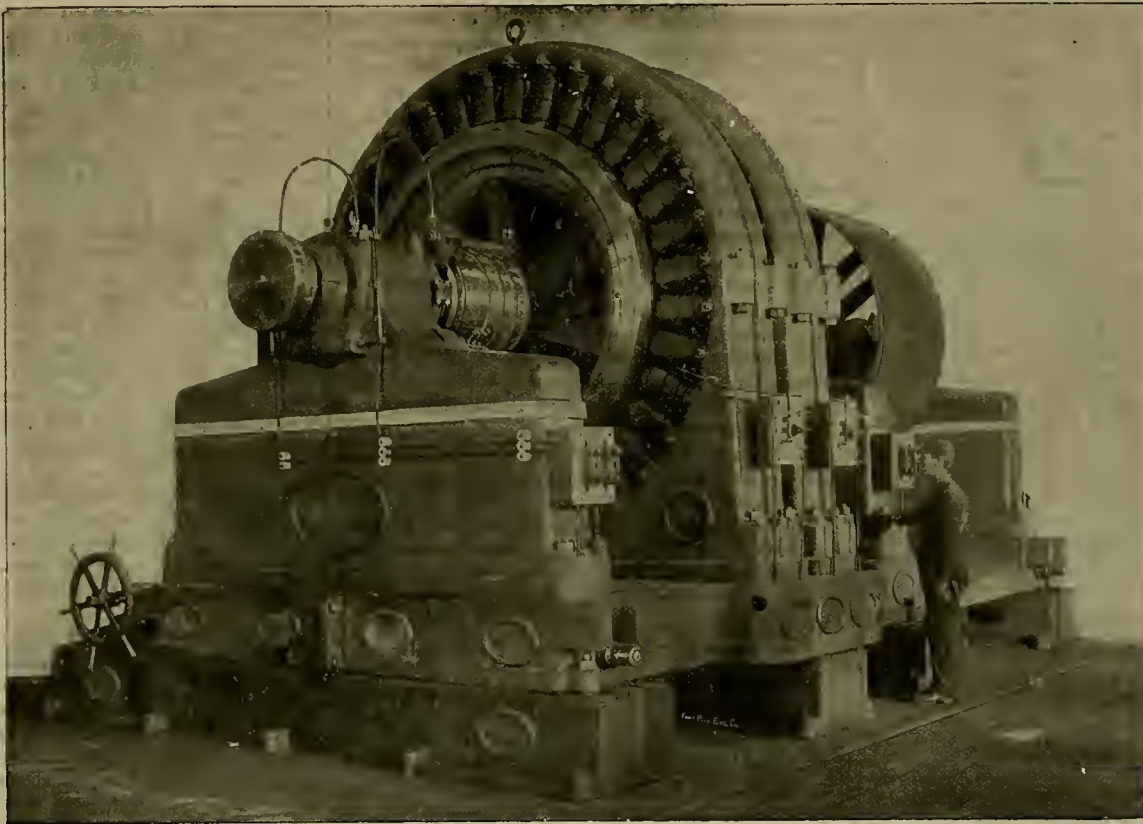
The illustration presented upon this page is of a 1000-H. P. generator of the first-mentioned class. It is practically a double machine, consisting of two fields mounted upon the same headplate, and two armatures carried upon

Miners' Wages Will Not Be Lowered.

There are strikes and strikes. Some are successful, others not; some are justifiable, others not. Miners' strikes in the Pennsylvania mines are of frequent occurrence; and they are, or have been, by no means rare in the West. But a strike in California is an uncommon occurrence. It is not difficult to explain the reason, which is that miners' wages are low and there is absolutely no pretext upon which they can be justly made lower. It should be added, also, that the absence of unionism among the miners is an influence that must be considered. It must

not be understood by this latter statement that there is want of fraternity, or of mutual dependence and helpfulness among miners, or of common inspiration to assist one another in time of need. California miners are loyal to themselves and to one another. There is no class in which there is more genuine charity and unselfishness and willingness to follow out the precepts of the golden rule.

THE celebrated Tyler-Last Chance mining case, on appeal from Idaho, has just been decided by the Federal Court of Appeals in this city, in favor of the Tyler. The litigation has been of years standing, and has involved the expenditure of vast sums of money. The claims adjoin, and the trouble was, like many others, as to disputed ground.



750 KILOWATT TWO-PHASE ALTERNATOR, MADE BY THE WESTINGHOUSE COMPANY.

the same shaft. As in the two-wire synchronous system, the fields are circular castings, having inwardly projecting poles of laminated steel, while the armatures have T-shaped teeth of similar material, beneath which the coils are wedged. A belt-driven generator of this type weighs about 75 tons.

A REPORT has gained circulation that the great Utica mine at Angels is about to be sold. The rumor is that the mine is to be sold to the Brownlow Syndicate, London, for \$29,000,000. The mine has stood in the name of Alvinza Hayward, the heirs of the Hohart estate and Charles E. Lane. It is said to be the desire of the Hohart heirs to dispose of the property, because they wish to partition the estate, otherwise the rumor would appear to have no color. The Utica mine is the best paying gold mine in the country. It is free milling and pays over \$42 to the ton. There are about 200 stamps working at the mill and the men employed number not less than 150 in each of the shifts. The mine yielded over \$1,000,000 last year, a very large part of which was profit.

The Last Chance extended its workings into Tyler territory. It is said the Tyler is owned by men who are not practical miners, and if they desire to work the ore body they have just won, will have to purchase the Last Chance to use its side hill for the works. Rather than do this it is believed they will sell to the new parties. As the Tyler mine stands now it is the cheapest big property ever developed in the northwest, as the work the Tyler people performed was nominal, while the Last Chance expended upwards of half a million dollars before the big ore body was struck. When the Tyler commenced its suit damages were asked in \$200,000 for the value of the ore removed from the disputed ground. In the verdict given in the United States Circuit Court at Moscow the damages were not considered, the court holding that the right to the property should be first established and the claim for damages could then be taken up and an accounting had. This still remains to be done.

THE total output of coal from the British Columbia mines for 1893 was a little more than 1,000,000 tons.

MINING AND SCIENTIFIC PRESS.

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Our latest forms go to press on Thursday evening.

Entered at the S. F. Postoffice as Second-Class Mail Matter.

San Francisco, April 14, 1894.

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Assessment Work for 1894.

The desire of many miners that the provisions of the law suspending assessment work for 1893 be extended to 1894 meets with a great deal of opposition in Congress. True, no test of sentiment has yet been made, but it is a fact that when the bill for 1893 was proposed it also included 1894. This proposition encountered much objection, and, to save the bill, Congressman Bell, of Colorado, went before the House Committee and consented to an amendment striking out 1894. In this shape the measure became a law; otherwise, it was certain to be defeated.

It cannot be said that the miners of the gold States take a great deal of interest in the measure; at least they do not by any means consider it vital to their welfare. In the silver States the matter is regarded quite differently. If it were possible to exempt the silver mines only, there would be no great objection to suspending the provisions of law in their favor alone; but it is not. If any mines for precious metals are favored, all must, in the nature of things, be included. Whatever is done, it is desirable that it be done very quickly. We think it probable that a bill for 1894, containing exactly the same provisions as last year's law, can be passed by this Congress; but it ought to be done at the present session before any assessment work is done and while all have a chance to secure its benefits.

THE silver question before Congress appears to have gotten into a curious situation. If we are to credit newspaper accounts, it is about as follows: In the last paragraph of his veto message the President intimated that he would sign a bill for the coinage of the seigniorage if coupled with a provision empowering the Secretary of the Treasury to issue bonds. This action on the part of the President seems to have split the silver men into two factions. Some of the free-silver Congressmen are willing to accept this as the solution of the problem, glad to get something to go to their constituents upon, but the greater part of them declare that they will never consent to the issue of bonds.

The Administration Democrats, on the contrary, are nearly all anti-silver men, and while willing to grant bonds will not vote for the coinage of the seigniorage. This is also the position of the anti-silver Republicans. In view of all this, the free-silver men find themselves divided and can really look for aid no quarter.

THE California Debris Commission has issued a permit to the Snow Bros. to operate by the hydraulic process a mine near Newton, El Dorado county. The approximate capacity of the restraining reservoir to be constructed is 161,000 cubic yards. Authority has been given for the construction of debris dams to James Hackett of the Oriental and Tahoe mines at Rough and Ready, Nevada county; also, to Pascoe & Gruben, in the Eureka hydraulic mine near Placerville, El Dorado county.

Title to Railroad Mineral Lands.

A case whose determination is of direct consequence to miners of many sections of the West was argued in the Supreme Court of the United States last Wednesday. Its title is *Braden versus the Northern Pacific Railroad Company*, and the question at issue is as to the interpretation of the Northern Pacific Railroad grant in that clause excluding mineral lands from its operation. The facts of the case are briefly that Braden attempted to secure patent to mineral land on an odd-numbered section within the railroad domain from the land office by conforming to the usual requirements. The railroad company resisted the issue of patent on the ground that title to all land in odd-numbered sections within their domain was expressly vested in them by the Government, except that known to be mineral at the time they filed their definite map of location. It will at once be seen that the facts are substantially the same as those determined by United States Circuit Judge Lorenzo Sawyer in the case of the Eagle Bird mine (*Francœur vs. Newhouse*), when, in 1890, he decided that lands not known to be mineral at the time of the grant were the property of the railroad company and not the Government, and title must be secured from the railroad. The Montana case was considered of such importance by the United States Supreme Court that a argument was heard by the full bench.

It is well known in California that the Central Pacific Railroad Company, backed by the Sawyer decision, claims all lands on odd-numbered sections within its grant not occupied at the time of the grant; in other words, it claims everything whose possession by some other at the time of filing its definite map of location was absolute and could not be disputed. This was in 1866. Therefore, the Central Pacific Railroad claims all mineral lands within its grant discovered since that time, nearly 30 years. The company has been fought bitterly for many years by various claimants, but without success. Under local conditions and local practice and decisions, it has become apparently firmly entrenched in this position, so that a claimant of mineral railroad lands has been compelled to secure title both from the railroad company and from the Government—a system, to say the very least, annoying, expensive and burdensome. The land offices have generally recognized the claims of the railroad company, and in many instances it is necessary to secure a quitclaim deed or other abandonment from the railroad company on odd-numbered sections before the land office will grant patent. The practice has been, in some instances, the same in Idaho, Montana and Washington, along the line of the Northern Pacific Railroad, the terms of whose land grant are much the same as to the Central Pacific Railroad.

It will be remembered that last fall, in this city, the United States Court of Appeals decided a case which in a measure controverted the Sawyer decision. It was entitled *N. P. R. Co. vs. Cannon et al.* Cannon had applied for and secured patent to mineral land on an odd-numbered railroad section. The railroad company then sought to have the issuance of patent set aside, on the ground that it was entitled to personal notice of the patent proceedings. The appellate court held that no special summons was necessary. The officers of the Land Office had given the usual formal notice by publication and post, and if the railroad company did not then interpose as contestant it was entitled to no personal notice thereafter. The court expressly held that "when appellant (the railroad company) accepted the (Government) grant, it knew that mineral lands were excluded from its grant, and the law charged it with notice that mining locations and applications for patents might be made, and patents obtained therefor by persons claiming the lands to be mineral." The railroad company therefore had the same right to contest as any other person or corporation, and no more. Having been charged to take notice of application for patent by the usual form giving notice to all the world, and having failed to avail itself of its opportunity, the question of the mineral character of the land became a question solely between the applicant and the Government.

This decision, if it does not in express terms declare, strongly implies that the railroad company's title to any mineral land is not valid. We have not heard, however, that it has altered the practice of the land offices or the claims of the railroad company in this State, though perhaps it has along the line of the Northern Pacific. It can be expected, however, that the much-disputed matter will now be settled by the United States Supreme Court.

IN answer to a question, it may be said that a prospector may take up as many claims as he desires, provided he follows the regular forms; and he can hold them by performing \$100 of work each year on every claim, or he may confine all the work to one claim, if they adjoin, and the development work is intended for the development of all.

California Mines at the Midwinter Fair.

Siskiyou County.—The conspicuous features of this exhibit are a collection of ores showing the variety and value of the county's mineral resources, and four cases of native and specimen gold, illustrating the purity and beauty of its gold product. The former are displayed in the space assigned to Siskiyou county, on a spacious table. No attempt at ornamentation has been made; but the various ores, gravels and other articles have been properly labeled, and attract attention from many visitors. The specimens were by the fair management considered of such unusual excellence that they were detached from the county exhibit and given a prominent place among a general collection of quartz specimens and native gold, near the center of the entire exhibit.

It is proper in this connection to mention Siskiyou's leading mineral characteristics, inasmuch as they present features which distinguish the county from others. As Placer is the home of drift mining, so has river and hydraulic mining an undisturbed abode in Siskiyou county. Its quartz mines are of value and, though the veins are as a rule narrow and the development in this direction comparatively limited, there is no reason to doubt that vein mining has a great future here. The presence of an ancient river channel is definitely known, having been traced continuously for nine miles from Henley to a point near Yreka; and undoubtedly drift mining will, sooner or later, be carried on there successfully.

The actual auriferous area of Siskiyou county is small; practically it is scattered over the western three-fifths of the county. There are six quartz-mining districts, three of which are generally termed the Salmon River district, but placers are widely scattered and cannot be so closely grouped.* For convenience, however, the mining districts of the county may be named as follows: Salmon River district, including the quartz and placers of the entire Salmon river drainage system; Callahan's Ranch, being the placers of the South Fork of Scott river; Quartz Valley, the quartz and placers of the valley of that name in the northwestern corner of Scott valley; Scott Bar, placers and quartz of the Scott river from where Mill creek joins it to its junction with the Klamath river; Klamath River, being the placers in the canyon of the river from Cottonwood creek to where the Salmon river comes in, including many old districts, unimportant now; Humburg Creek, the quartz mines on the several branches of Humburg creek east of Old Baldy summit; Deadwood, the quartz mines on the opposite slope of Old Baldy, and the placers of Indian and McAdam creeks, tributaries of Scott river heading in Old Baldy; Hungry Creek, quartz mines in that stream and on the headwaters of Cottonwood creek; Yreka, the quartz mines and placers near the city and Hawkinsville; and Henley, which might more properly be termed Blue Gravel. It is sufficient to mention the above as indicating in some measure the opportunities for quartz mining in the county; and to add that, with the exception of the Black Bear, there are no other very large mines. Siskiyou is, or has been, essentially a "poor man's" county. There is a great variety of small mines, and few large.

The chief interest in this county extends to its river mining and hydraulic and placer mining enterprises, mostly along the Klamath and tributaries, the operation of which has never been interdicted by order of the court. The method of mining along the Klamath, though often explained, will bear further elucidation. The Klamath is a crooked torrential stream, with tremendous flood stages, and a volume of flow only exceeded in the State by the Sacramento. The placers are the river bed for many miles, drift diggings in a few of the bars, notably at Hamburg bar, below the mouth of Scott river, and hydraulic placers, principally in the benches, some of them as much as 500 feet above the present river bed. The gold in appearance is very uniform, being a fine scale gold, smooth and water-worn. There is very little flour gold, and only a few claims produce nugget gold. The beds, bars and benches of the Klamath river, in the aggregate of 40 years of mining, have yielded an enormous amount of gold, and much yet remains in the unworked ground.

River mining on the Klamath is followed from about the mouth of Shasta river to Hamburg Bar. The claims are not as numerous as in former years, much of the ground being worked out and abandoned. Sixteen were being operated in 1892. The method of mining is the same in all the claims. Wing-dams are built of rock-filled cribs of poles, and faced inside and outside with inch planking. From 10,000 to 30,000 square feet of the river bottom is inclosed with these and cleared of water. A pit is sunk in this exposed river bottom; the top rock and sand containing no gold are removed by derricks down to

*A portion of the facts in the above review is obtained from the excellent article on Siskiyou county, by Russell L. Dunn, E. M., in the State Mineralogist's Report for 1892.

pay gravel, on and close to the bedrock usually, and the latter is then washed and the gold obtained.

Three current wheels are usually employed. A pump wheel, operating a Chinese or rotary pump; a bull wheel, which furnishes power to the hoist of the derrick, and a water wheel of much greater diameter than the others, rigged with buckets, which it lifts full of water to the head of the washing sluices. Occasionally the latter wheel is not necessary, water being taken directly from the river into a ditch and conducting it to the sluice. The fitting up of a claim, labor and material, costs from \$2500 to \$5000, and for the most part has to be all done anew for each season's work, though occasionally some of the plant is taken out of the river and above high-water mark before the flood stages of the river come and wash everything out.

Each claim employs from 10 to 40 men, working in two shifts, night and day. Pitch pine is employed for lighting the mines at night. The total expense of fitting up and operating each season is from \$5000 to \$8000. As a rule, the claims pay this back and something more in the way of profit, with a chance always of finding one of the very rich spots in the river from which the lucky miners may take out a fortune in a season's work. The Chinese are more and more acquiring a monopoly of this branch of the mining industry through purchase or lease of the claims from the white men.

The aggregate output per annum is about \$225,000.

The hydraulic mining industry of Siskiyou county has representation in a large number of mines, one or two of which it is worth while to mention. In Quartz valley the R. H. Campbell Gold Mining Company (limited) has 650 acres of placer ground and 850 acres of agricultural and other land covering the main watercourses of the valley, Shackleford and Mill creeks, for dump, site for drainage tunnel, and the heads of a ditch on Shackleford creek. The higher and shallower portions of the mine have been worked by the old miners and by the predecessors of the present company by ground sluicing and hydraulicking, the latter at one point assisted by an elevator. A considerable area, however, can still be effectively worked by hydraulicking, particularly in what is known as the Hull Gulch claim, the farthest up the valley. The area worked off by hydraulicking during 1892, the depth of ground being 35 feet, paid at the rate of \$25,000 an acre. Previous to the formation of the company, Mr. Campbell operated the mine by hydraulicking for ten years, about one month or less each year, taking out from \$15,000 to \$40,000 per year. The cost of the property altogether was \$100,000, the total sum realized over \$200,000. Without going into details, it may be said that the high ground is now comparatively limited in area and it will be necessary to work hereafter either by drifting or by elevators. A series of elevators is now contemplated. The water for this purpose is ample, being about 4000 inches. As it is now, the waste is tremendous, and there is generally insufficient water after August 1st; but it is designed to put in storage reservoirs, giving an equable flow as long as snow and cold weather do not prevent operations. These plans involve the expenditure of large sums of money and for that reason Mr. Campbell has enlisted ample English capital. The recent financial panic has for the present prevented the prompt development of the property on the lines contemplated.

In the Salmon river district, last year, occurred the greatest activity in Siskiyou county mining. A new road has just been finished from Yreka, via Etna, making the transportation of supplies easier and cheaper. Several new mills were erected last year, and more will probably be put up this year.

One of the recent successes in Siskiyou county has been the Greenham mine near Yreka, where a large placer deposit is being worked both by shaft and tunnel. The hoist and pump are worked by steam. The average pay is from \$250 to \$5 per yard, and about \$1000 per week is now being taken out.

The above is a very inadequate statement of the development of the fine mineral resources of Siskiyou county. The statements are called forth by the display at the fair, and may serve to indicate in some degree what is being done in the various branches of the industry. A partial summary of the articles displayed is as follows:

Specimens of gold ore from the Fairy Queen mine, the Golden Eagle, the Harrison, Spencer, Third Trial, Sterling, World's Fair, Tuscarora, Last Chance, Mammoth, Sergeant Brothers', Banner, Siskiyou, Mountain Belle, Punch Creek, Jassmond & Humphrey, North Star, Dale & Kiernan, Galena, Pennsylvania, Fagnones, Ahe Erno, Big Ledge, Grizzly Bear, Myers, Schroeder, Gold Run and Hunter, Empire, White Bear, Jumbo, Franks, Gold Ball, Boss and Hibernia mines; asbestos from the Salmon mountains; galena ore from the Humbug district; chrome iron, blue gravel and cement, soapstone, sandstone and petrified wood; a rock from the summit of Mount Shasta; pottery clay, granite, onyx, lead ore, copper ore, cinabar, agate, coal, gypsum and lime; a petrified pine burr, fossilized sandstone, dentritus (picture rock), four varieties; petrified clam; volcanic glass, or obsidian; Mount Shasta lava; galena, marble and limestone.

The Ashland Strike.

The strike in the Ashland mine, in Jackson county, marks an epoch in the mining development of southern Oregon. At a depth from the surface of 575 feet, a 600-foot tunnel has struck the ledge, thirty feet across the walls and carrying a good body of quartz. It is well known that vein mining in Oregon has always been confined to bodies of ore near the surface, depth never being attained. It was the opinion of many, and the practice of all, that the veins were not permanent, and would pinch out at a depth of a few hundred feet. Spotted ledges, pockety quartz and unreliable stringers were generally believed to be the characteristic features of the mines, and systematic deep mining was unheard and unthought of. It remained for the Ashland mine to make the first practical test of the character of the veins and to dispel prevalent theories about their superficiality. The mine was being worked by shaft, but the water so increased that it could not be banded. A drain tunnel was necessary. The experience and judgment of the operators convinced them that the ledge was permanent, and they decided to seek the ledge by a drain tunnel 400 feet below the 200 level. This course was unusual in southern Oregon, but the sound judgment of its projectors is amply justified by results. After 600 feet of dead work the ledge was struck in place. The future of the mine is absolutely assured. It cannot be doubted that the success of this enterprise will be a great incentive to more general and systematic development of other southern Oregon mines.

It should be added to the above that there is one other mine in southern Oregon which has attained a depth of 600 feet—that of Kubli & Bolt, in the Galice Creek district. The circumstances, however, were different. The vein, a narrow one, was followed in development. The mine is still being worked, the quartz being crushed in an old-fashioned arrastra.

Slitkens.

A COSTLY PLANT for refining borax is being constructed in Cottonwood canyon, Churchill county, Nevada. The works will produce 20 tons of refined borax monthly, and will give employment to about 20 men.

SOME prospectors recently returned to Campo, San Diego county, from the desert, exhibit fine specimens of gold rock, but are very reticent as to the locality of the find. They are preparing to return and open up the ledge.

THE Diamond Coal Company has been incorporated. Principal place of business, Los Angeles. Capital stock, \$20,000, with E. R. Kellern, R. C. Horton, P. W. Hoyle, M. Y. Kellern of Los Angeles, and N. Hoyle of Toro as directors.

THE Salt Wells Borax Company has been incorporated. Principal place of business, Independence, Inyo Co. Capital stock, \$2000, with Fredericke Rhine, Harry Rhine, F. E. Deusmore, Charles Ling and Wall Lee of Independence as directors.

THE mining camp of Kennedy, Nev., promises to be the banner gold-producing section in that State. There is some likelihood of a new railroad being built from Lovelock or some other point in the county to the copper mines in Churchill county.

THE *Critic*, a Johannesburg paper, offers a huge cake to the mine making, month by month, the best returns from its mine and mill. During January the cake was awarded to the Glencairn Company, of which Ernest Wiltsee, formerly of Grass Valley, is manager.

PLACER GOLD has been discovered within a mile and a half of Tehachapi and prospects well. From three pans of top dirt there was taken out 374 cents of the yellow metal one day this week. There are a number of men out prospecting and a rich find will not be a surprising event.

On Saturday, at Grass Valley, the annual meeting of the North Banner Consolidated Tunnel Company was held, 68,579 shares being represented. W. E. Brown and L. Gilson of San Francisco, and George Fletcher, J. F. Kidder and Joseph Weisshein were elected directors for the ensuing year.

At a meeting of the directors of the Morning Star Mining Company, held at the company's office in Colfax on Monday, April 23, dividend No. 40, amounting to \$3 per share, was declared. This is a regular monthly occurrence, and promises to be for a long time to come. The mine is looking as well as usual.

THE Sunrise Mining Company of Nevada county has filed articles of incorporation and named the following officers for the ensuing year: E. H. Baxter, president; George F. Hill, vice-president; D. J. Halloran, E. F. Baxter and J. P. Sweeney, directors. The mine is situated on Osborn Hill, 1½ miles south of Grass Valley.

It is now reported that Senator Wolcott of Colorado and Henry Wolcott have sold the Mercur gold mine in Utah to a party of New York capitalists for \$1,000,000. The new company will use electricity in the mine. The ore runs from \$8 to \$16 a ton. The vein is flat, eight to fourteen feet thick, and is worked like a coal mine.

CHARLIE ROSS (not the lost) was sitting in front of a stove at a Nevada City hotel the other day, when suddenly something exploded in his pocket. It was a giant powder cap which had probably been ignited by contact with a match. The side of Ross' vest was torn out and he received a painful wound in his hand, otherwise he is doing quite well.

THE siren at the Maryland mine, near Grass Valley, which takes the place of the old-fashioned whistle, is something new in this part of the country, says the Nevada City Transcript. It can be plainly heard in this city, and when the wind is

right the tones are like that of a huge æolian harp. Compressed air is used instead of steam to blow the siren.

CHARLES MARTIN came to San Bernardino last week and gave himself up to the authorities. He says that on April 5th, at a point about 40 miles east of Banning, he shot and killed a man named James in a dispute over the ownership of a mining claim. He claims that James and others jumped his claim, and in an altercation which followed he shot and killed James in self-defense. James was a resident of San Diego and Martin is of San Bernardino.

A DISPATCH from Cripple Creek, Colorado, April 8th, says: The miners had a stormy meeting to-day at Anaconda. President Calderwood of the Altman miners declared that the acceptance of the mine-owners' schedule would be suicidal to organized labor. John Wilson urged the wisdom of accepting, as miners had to work in other Colorado camps for \$2.25 to \$2.50 per day. The miners rejected with cheers the mine-owners' proposition of \$2.63½ per day of eight hours.

IN the Silver Star district, Esmeralda county, Nev., the Hard-scrabble mine, owned by Edward Brown, is said to be the best property there so far. To a distance of 35 feet he has a ledge four feet wide, the ore from which will average \$50 per ton. The Orphan Boy, owned by Douglass & Co., has a tunnel in about 60 feet and an incline 40 feet. The boys have on the dump about 20 tons of \$40 ore. The Julia, at a depth of 30 feet, is showing \$25 ore, and the Dollie, at 20 feet, \$20 ore.

A DISPATCH from Cripple Creek, Colo., says the greatest gold strike of the year at Cripple Creek is reported in the Caledonia. The mine is located with the vein, which is eighty feet wide. The lowest assay shows \$9 to the ton; a half-ton assayed \$100 to the ton. Several feet will run half that amount. Quartz streaks three to four inches wide will give as high as \$1000 to \$1500. The mine has been opened for two years, but attention has been called away from it and its richness was not dreamed of.

R. M. MACKAY, a California miner who has been mining in British Guiana, writes from Georgetown, under date of February 23d, to a friend in this city, asking him to advise Californians to stay away from that country. He writes that there is some gold in the colony, but that it is as much as a man's life is worth to go and look for it. There are a few rich alluvial mines that pay five and six pounds of gold per day to the long ton with five men working, but the average of the placers does not exceed two ounces of gold dust to the string of sluices with eight men working.

SOME weeks ago a miner named Wallace lost control of a windlass while hauling three miners up a shaft of the Helvetia mine, near San Diego, and they were precipitated to the bottom of the shaft. The men were not seriously injured and soon succeeded in climbing out of the hole. Wallace immediately disappeared, evidently crazed by the thought that he had caused the death of the men. No trace of him has been found since and fears are entertained for his welfare. He left a wife and six children in destitute circumstances. They have applied to the authorities for aid.

THE mine, furnaces and plant of the Oregon Iron and Steel Company, near Portland, Or., with the exception of the pipe foundry, have been leased for a term of years to Eastern iron-makers, who have sent an engineer to the mine purchased by the company some time since at Tepustete, Lower California, to superintend the building of wharves, bunkers, etc. As soon as a cargo of ore is received, the furnace will be lighted and about 200 men employed. As the ore from Tepustete is suitable for Bessemer steel it is the intention, after a time, to establish rolling mills in connection with the furnace.

A SPECIAL from Frisco, U. T., says: The new concentrating plant and hoisting works of the Horn Silver mine have been totally destroyed by fire. The mill made its first run on April 1st, but was not in operation when the fire broke out. The fire is supposed to have been of incendiary origin. The timbering of the shaft is on fire, and the ground is supposed to be caved in for a distance of 200 feet. Men were sent through the air shaft, but were unable to get near the main shaft on account of the smoke. All the miners were hoisted safely excepting six, who were compelled to climb the ladders through the air shaft from the 700-foot level. The loss is estimated at \$100,000. Operations will be resumed as speedily as possible.

It is reported from Boise, Idaho, that Benjamin Wilson has sold to J. C. Kempvance, representing a London syndicate, his placer lands in the vicinity of Pioneer, in the Boise Basin, near Boise. The consideration is \$300,000. The tracts sold aggregate about 2000 acres, the pay dirt being from 30 to 40 feet deep on an average. The sale includes over 100 miles of ditches and flumes and all the hydraulic apparatus belonging to the property. These claims have been worked for 30 years, and have produced a large amount of gold. The product is an unknown quantity, as no figures have been given out. Formerly the ground belonged to a number of companies, but all other interests were bought out by Mr. Wilson many years ago. He has since worked the property continuously.

THE Wolcott resolution for the coinage of Mexican dollars at United States mints has been passed by the Senate, and it will probably also pass the House. The full text is as follows:

Resolved, That the President of the United States, with a view to encourage and extend our commercial relations with China and other Asiatic countries, be required, if not incompatible with the public interests, to enter into negotiations with the Republic of Mexico looking to the coinage by the United States at the mints of a standard Mexican dollar under some agreement with the said Republic of Mexico as to seigniorage, method and amount of said coinage, and that he further report the result of his negotiations to the Senate.

GEORGE LOOMIS, the president of the Pacific Oil Company, owning large deposits of petroleum in southern California, and a well-known member of the mercantile community, died early on Sunday morning at the Menlo Park residence of his brother-in-law, ex-Senator Charles N. Felton. The deceased, who was born in Syracuse, N. Y., was sixty years of age. Mr. Loomis was well known for his enterprise in business affairs.

Gold Mines of Southern Oregon.

Written for the MINING AND SCIENTIFIC PRESS by Alex. Quartz.

Now that some of the southern Oregon mines are attracting considerable public attention in the East as well as on this coast, the following facts regarding the quartz-mining industry and its outlook may be of interest and value to those who are in quest of information relating to that section.

Ashland and vicinity—now the most prominent district in Jackson county—promise to become a prosperous and booming camp in the near future. The Ashland mine, which has paid good dividends continuously for the past year or more, has proven to the most skeptical that there is at least one permanent paying mine in that district. For years past, when speaking with mining men of the mines of southern Oregon and northern California, the majority of them said: "Yes, they all prospect well enough on the surface, but the mines don't go down in that section like they do in other places." To one and all I made the same answer. "The mines do go down, but it is the miners that don't go down." My opinion was based upon the knowledge I have of how most of the quartz mining and prospecting work in that section has been conducted until recently. A crosscut tunnel was run to cut the ledge in the Ashland mine at a depth of 600 feet, and various opinions were expressed by "the knowing ones" as to what would be found when they reached the ledge—if the ledge reached that depth at all. The ledge, which was cut a short time ago, proved to be 30 feet between walls, with eight feet of better ore than has been heretofore found in the mine, and confirms the theory that the ledges do go down in that section and carry the pay like they do in other places.

The development of a great ore body at a depth of 600 feet in a measure decides the future of the district. It will tend to give prospectors and capitalists more confidence in developing ledges which they were doubtful of before. There is one serious drawback to any district, that this strike in the Ashland mine may cause, and that is a raise in the price by those who have claims to sell, which will only serve to scare away capital and retard development work. The geological formation in the vicinity of Ashland is favorable for the existence of deep and permanent fissures and ledges—granite, slate and porphyry in well-defined belts being the principal country rock.

The Golden Fleece mine, situated three miles north of Ashland on the line of the Oregon and California railroad, is another property that is attracting considerable attention at present. This mine promises to become one of the largest low-grade gold mines in America, and, while in proportions it is like unto the great Treadwell mine of Alaska and the Homestake of Dakota, yet it is of a very different class, being similar to the Mercur mine of Utah. The reef or deposit is undoubtedly a portion of the prehistoric river channel that at one period drained the western slope, running parallel with the coast line, and is plainly traceable from the Umpqua river in Oregon to Trinity county, Cal., and on which there are several mines located and worked. The deposit, which is vast in extent, contains a curious combination of minerals, gold, cinnabar, native quicksilver and native amalgam all existing together in the same conglomerate mass. The deposit, or reef, which runs in an almost easterly and westerly direction, dips into the mountain side at an angle of fifteen degrees. The footwall, or bedrock underlying the deposit, is a porphyritic slate, cut in many places by seams of feldspar, carrying a large per cent of cinnabar, while the capping, which could be called the hanging wall, is a metamorphic sandstone. This metamorphic sandstone capping, in most places where it is opened in the mine, does not terminate abruptly where it joins the ore, but amalgamates with it where they join, so that it is in places difficult to determine where the sandstone cap ends and the ore begins. The ore underneath the capping appears to be a washed gravel cement, which gradually changes into an oxidized conglomerate mass of ore with little or no traces of wash gravel at the bottom. The present method of working is by an open cut into the deposit, and the ore, which is strongly oxidized by the presence of a large percentage of iron, pulverizes very easily, as high as one ton per hour being worked with a 3½-foot Huntington mill, using No. 40 slot screens. The gold, most of which is on the coarse order, is free in the ore or conglomerate, and all shows evidence of being wash gold at one time, though in its present condition it is heavily coated with iron and other minerals.

The general average of the assays and tests of the ore give a result of \$4 per ton. This mine can be worked, owing to its many natural advantages, cheaper than any mine on the coast. The present cost of mining and milling the ore on a small scale is about 65 cents per ton, ample water power for a large plant being available. The development of the mine on an extensive scale will be an im-

portant factor in bringing the mineral resources of southern Oregon into prominence.

A new ten-stamp mill is being erected on the "Shorty" mine on Wagner creek only a few miles from Ashland. As far as developed, this mine makes an exceptionally good showing, and will prove a good paying property beyond a doubt.

The placer mines of Jackson county have continuously produced gold in paying quantities since early in the "fifties," and if the generally accepted theory be true, that where there is a large number of good paying placer mines there must also be good quartz mines, there is certainly a good field for the prospector and capitalist in Jackson county, and especially on the slope of the Siskiyou range from Ashland to Jacksonville.

Although southern Oregon, and Jackson county in particular, which I visited recently, have been "black-eyed" and "cursed" by "natural gas" (?) capitalists and miners for years past, I firmly believe that in another year it will become prominent as one of the leading gold-producing sections of the Pacific slope.

ALEX. QUARTZ.

Mineral and Railroad Lands.

TO THE EDITOR:—It is necessary for the miners to have land to explore, on which they can get a valid title. This the miners in the northern part of California do not have. Here title must be obtained by purchasing mining claims on odd sections from two separate land offices. One purchase is made from the Southern Pacific land office, where the land is bought as agricultural land; and, again, the land must be bought at the United States land office in Redding, where the same land is sold as mineral. Each gives the miner what purports to be a title. Both titles have been sustained by the decisions of courts, while other courts have declared each void.

The railroad company's land office gives the miner a quit claim deed for agricultural land. The United States land office issues a mineral claim patent on the same land. A quit claim deed given by the railroad company on a section of mineral land can lie in hiding until some miner finds a rich mine on it; then, under Judge Sawyer's decision, the miner can be dispossessed, even though he has a Government mineral patent.

On the other hand, the railroad company's quit claim has in no case as yet merged into a title, and whether it ever will is very doubtful. The clause in their grant exempting mineral land must get some fearful judicial twists before the railroad company can give a clear title to land not given to them in the grant. There is a "pull-Dick-and-pull-devil" business going on between the railroad company and the United States land department, over mineral land, by which the miner suffers by every move either makes. The only chance that the people of California have of getting this land, if they do not want their mineral land to pass into the hands of a few men, is to have Congress appoint a committee to examine the land and report, stating the true condition, how this corporation is selling the mountains containing mineral as farming land.

Some time ago a complaint was made to the commissioner of the general land office that the Southern Pacific Company was selling mineral land, and a full statement was presented, with a request that some one be sent to make a report. This was sent to the commissioner, accompanied by affidavits. After some months of waiting, a long and wordy document was received in reply, with this farewell to it: "Your complaint is hereby dismissed for the reason that there are non-mineral affidavits on file on this land." Signed by commissioner general land office. The land referred to was that lying north of Redding on the Oregon line.

What the miners would like to know is, who filed those affidavits; who perjured themselves to let this railroad corporation sell mineral land? The mineral affidavits of the miners are on file in the Redding United States land office, and are open for inspection. If those non-mineral affidavits gave all the right the railroad company has to our mineral land (the commissioner's decision infers that) we would like to see whether they are true or not before some fair-minded court. The attention of our Congressmen, Senators and the next Legislature of this State will be directed to this wrong and may stop this duplicate land-office system and double titles.

The title to a valuable quartz mine must be perfect or no one will invest money in it. Under the system of this corporation, which was arranged to suit them, there is no telling where title begins or litigation will end.

Shasta, April 9, 1894.

JOS. E. BELL.

Mine Explosions Generated by Grahamite.

In a paper read before the American Institute of Mining Engineers recently, Mr. William Glenn drew attention to a somewhat novel cause of colliery explosions. The

Ritchie grahamite mines of Ritchie county, West Virginia, are situated near the central part of the upper barren coal measures of the Appalachian coal field. The rocks of the region are shales and sandstones, which lie almost horizontal. They show no evidence whatever of containing carbonaceous ingredients, except that they enclose, at long intervals, thin veins of exceedingly impure coal. The vein of grahamite is a straight and vertical fissure, which cuts downward across the horizontal strata of the rocks mentioned. Quite recently two explosions occurred in the mine, after shots had been fired, which could not be traced to gas, and which were clearly due to the ignition of fine dust.

The Nevada City Strike.

The first serious miners' strike in California for a long time occurred last Monday at Nevada City. For some time past the Harmony gravel mine has not been yielding enough bullion to pay expenses; in fact, there has been such a falling off in the monthly output that a portion of the directors were in favor of closing down.

Superintendent Gowell, who owns the controlling interest in the mine, proposed a reduction of wages from \$2.50 to \$2 a day. This was strongly opposed by nearly all the other directors and stockholders, the majority of whom favored the closing of the mine rather than bringing wages down any lower.

Mr. Gowell then himself decided to try a reduction of wages. A notice was posted at the mine to the effect that the wages of all the men underground, excepting drifters, would be reduced to \$2 a day.

The announcement was received with indignation by the 30 odd men employed in the mine, and all of them went out on a strike. Monday evening it was learned that four new men had been hired at the reduced wages.

At about 9 o'clock a large delegation of miners left town for the mine, which is situated on the Washington ridge, about 2½ miles distant. A number of interested persons went along to see what would be done. As they drew near the house occupied by Superintendent Gowell the lights inside were suddenly extinguished. A rap upon the door brought a response from Gowell, who inquired what was wanted. He was quickly informed of their mission, and replied that he would come to town in the morning and talk matters over with the strikers.

Proceeding to the mine, a short distance away, they ordered Foreman Hotherell to have the four men who were at work underground come to the surface. He complied with their request. When the men came on top and saw the crowd they became panic-stricken and made a rush for the woods. There was no boisterous conduct and no talk of violence—only a determined stand not to allow any one to work in the mine for less than \$2.50 a day.

Gowell arrived at Nevada City shortly before noon on Tuesday and was closeted with some of the directors for several hours.

After his conference with the board of directors, and finding that he would receive no support from them or the citizens in his effort to reduce wages, Gowell notified the strikers that they could resume work at the old rate.

Foundry Notes.

THE contract for building the proposed new tower on the city hall has been awarded to O'Connell & Lewie for \$249,700, their bid being nearly \$10,000 less than the next lowest. The only probable change in the specifications concerns the plates of steel which will cap the apex of the tower. It is not unlikely that these will be painted instead of electro-plated, as a saving of \$14,000 would be effected by the substitution. The entire work must be finished before the end of the calendar year.

J. K. FIRTH, the machinist whose financial troubles began last year, has asked to be declared an insolvent debtor. The indebtedness foots up the total amount of \$60,205.50. The assets of the petitioner consist entirely of personal property, valued at \$40,000, and encumbered for nearly \$30,000. The principal creditors of the insolvent, with the amounts due each, are as follows: Pacific Rolling Mill Company, \$1442.39, secured by transfer of contract with L. Bonet; Dunham, Carrigan & Hayden Company, \$376.62; Mrs. A. J. Kittredge, \$829; San Francisco Lumber Company, \$209.29; San Francisco Novelty and Plating Works, \$254.37; Joshua Hendy Machine Works, \$271.98; J. P. White, \$243.95; Crocker-Woolworth National Bank, \$3000 on a joint note of the petitioner and John Treadwell; J. G. and J. N. Day, \$3500 on a note; Fisher & Co., \$400 on a note; John Treadwell, \$1551.98 on a note; Wells, Fargo & Co., \$771.40; James W. Whiting, \$26,500 principal and \$2572.40 interest on a note secured by a chattel mortgage on machinery, tools, fixtures, etc.; W. P. Sullivan, Jr., and Oscar Lewie, assignees of other creditors, \$14,295.77; E. A. Belcher, attorney's fees, \$350. The insolvent's assets consist of personal property of J. K. Firth & Co., valued at \$36,350, bills receivable for \$3200.53 and personal property of J. K. Firth as an individual, valued at \$700. The firm property is encumbered by a chattel mortgage for \$28,606.98, held by James W. Whiting and referred to in the list of creditors. Firth claims property exempt from execution to the amount of \$400.

ASSESSMENTS on mining stocks amounting to \$294,420 will become delinquent this month, of which Nevada mines call for \$248,920, California \$20,500 and South Dakota \$25,000.

The Pyritic Smelting Process.

IN TWO PARTS—PART I.

By Philip Argall, E. M., in *Engineering Magazine*.

The greater part of the precious metals produced in the western United States are extracted from their ores by the smelting process, in which base metals are the vehicles used to collect the gold and silver contents of the ores and concentrate them in metallic lead, in a copper matte, and sometimes in an iron matte. The method of smelting employed in each particular case usually derives its name from the base metal used, or from the particular ore employed in the process of reduction; we have, therefore, so-called lead smelters, copper smelters, iron matte and pyritic smelters, though the principal object in each process is the extraction of the precious metals contained in the ores.

The Omaha and Grant Smelting Works at Denver, Colorado, may be taken as a typical example of a lead smelter, combining all the recent improvements. The output from these works for 1893 was: Lead, 20,865 tons; copper, 481 tons; gold, 90,213 ounces; and silver, 10,059,711 ounces, having a total value of \$11,917,828. Now the value of the lead in this output is but \$1,441,000, from which it appears that, for each dollar's worth of lead produced, over six and a half dollars' worth of precious metals were unlocked from the ores and started on their mission of usefulness to mankind.

The Boston and Colorado Smelting Works, also at Denver, is probably the best example of a copper smelter in the sense used in this article. The output from these works during 1893 amounted as follows: Copper, 5357 tons; gold, 61,102 ounces; and silver, 4,177,117 ounces, having a total value \$5,607,186. Of this amount but \$1,071,478 was derived from the copper or base metal used to collect the gold and silver ores. Here, then, we see that each dollar's worth of copper produced gave an accompanying value of nearly \$4.50 worth of precious metals.

Iron matte smelting, or the reduction of raw or partly calcined sulphide ores for the purpose of collecting the precious metals in an iron matte, though not much practiced in the west, has been conducted at various European works from a very early date. The German authorities show that one Barthel Kohler used this system of smelting at Frieberg as early as 1585. Dr. Percy, in his metallurgy of gold and silver makes special mention of iron matte smelting, and he shows that it is specially adapted to localities in which lead ores are not procurable at a sufficiently low rate to justify lead smelting. Such are the conditions that obtain at the famous Kongsberg mines, in Norway, and there iron pyrite has long been employed in smelting the ores. It is added to the furnace charge to the amount of 15 per cent of the ore smelted and serves to collect the silver in an iron matte, which subsequently is desilverized by means of lead. The furnaces used at Kongsberg prior to 1847 had a capacity of only 10 tons of charge per day. The pressure of the blast used was one-sixth of a pound per square inch, and the consumption of fuel in the furnace about 22 per cent of the weight of the charge, the fuel being fir and pine charcoal. Iron matte smelting has long been practiced at Sala, in Sweden, in Hungary, the Altai mountains in Russia, and in various other parts of Europe.

The first step in the Swansea method of copper smelting is the production of a copper matte, or copper-iron matte, in reverberatory furnaces, from the partially roasted ores. This is the method pursued to-day at the Boston and Colorado works, already referred to as a copper smelter. It will be seen that in all these matte-smelting methods, both for iron and copper matte, the ores, if sulphides, are first calcined to drive off the excess of sulphur, or, if not sulphides, then sulphur is added, usually in the form of pyrite (as in the Kongsberg practice, for example), in such proportion that the resulting matte shall form but a small part of the total product of the furnace—say 5 to 15 per cent of the ore smelted. In this way the precious metals distributed in the ores become concentrated in an iron or copper matte. When sulphide ores are to be reduced by the lead-smelting process, they are first calcined to drive off the sulphur, and thus convert the sulphides of the metals into oxides.

Pyritic smelting, briefly, is iron matte smelting in blast furnaces, but it differs from the ordinary matte smelting in the fact that, in the latter, no attempt is made to utilize the calorific properties of the ores, while in the former the aim is to perform the entire smelting operation in the furnace by means of the heat evolved from the combustion of the sulphides. To the lead and copper smelter, pyrites and other natural sulphides are not the most desirable ores, though valuable, it is true, for their iron contents, but nevertheless requiring calcination before they can be smelted, and therefore demanding a more expensive treat-

ment, which often results in a greater loss of precious metals than occurs in the smelting of oxidized ores.

To the pyritic smelter, however, natural sulphides, particularly iron pyrites, are not only docile ores, but are also fuel, capable of being consumed in the furnace, smelting not only themselves, but also the fluxes necessary to form a slag of the desired composition. Pyritic smelting, then, is intended to be a process of smelting without the use of carbonaceous fuel in the furnace. This at first blush seems impossible, and, though a theoretical examination of the process shows that it should easily be accomplished, yet in practice a small amount of fuel is often found necessary, particularly where the ores are not of the proper composition and character to give the best results.

It may not be generally known that pyrite can be burned in very much the same way as coal or other fuel, and that, when consumed under proper conditions, it can develop a temperature very little less than that produced by the best coal. Some persons who are, or should be, familiar with the combustion of pyrite assume that all the heat is derived from the sulphur. This is an error. The calorific power of one gramme of mono-sulphide of iron, Fe S , is, neglecting that absorbed by the dissociation of the elements, about 1621 thermal units, of which 807 are evolved by the combustion of the sulphur and 814 by that of the iron. The temperature produced by the combustion of mono-sulphide of iron is shown by calcination to be about 2200°C . Sulphide of zinc gives a temperature of about 2000°C ; lead sulphide, 1860°C ; while coal, containing 80 per cent of carbon, 5 per cent of hydrogen and 15 per cent of noncombustible matter, gives a combustion temperature of about 2700°C . It is important, however, to note that, while the combustion of coal apparently produces a higher temperature, in reality the sulphide of iron does more work in the furnace, for in the first case much of the heat produced is absorbed in expanding the gaseous products of combustion and associated nitrogen, whereas, in the case of sulphide of iron, the resultant product being mainly protoxide of iron, the heat generated is applied to a more essential purpose, the smelting of the ore. These facts are easily demonstrated by a calorific calculation, which the limits of this article will not permit.

It follows, then, that for metallurgical purposes these sulphides, particularly pyrite, can be made to act as fuel when the proper conditions for their thorough combustion exist in the furnace. Pyrite will burn under the ordinary atmospheric conditions, and give out considerable heat. The heap-roasting of pyritic ores is a familiar example. This process is conducted on an extensive scale at Sudbury, Canada, where large heaps of the miccoliferous pyrrhotite are set on fire and burn for considerable time, the object being to drive off the sulphur and prepare the ore for the subsequent smelting operation. At the pyrite mines in Spain heaps of many thousand tons are set on fire and burn for a period of five or six months, with the evolution of immense quantities of sulphurous acid gas. This practice will, however, with the introduction of pyritic smelting, be relegated to the oblivion of the barbaric methods of metallurgy; for, apart from the destruction of valuable fuel and the locking up of large stocks of ores for long periods of time, it also results in destroying the vegetation and soil, producing a general appearance of desolation and decay in the neighborhood of the works.

Tasmanian Mining.

Twenty-seven years have elapsed since the Tasmanian Government commenced the compilation of mining statistics, says the *Mercury*, the quantity of minerals raised in the colony during 1867 being put down at 1363 ounces 5 dwts. of gold, valued at £4381 16s. Up to 1875 gold was the only mineral raised in any quantity, but in that year, in addition to £11,982 worth of the king of metals, 490 tons of tin, 3200 tons of iron ore and 7719 tons of coal, the values of which were not recorded, were mined. The production of these minerals, with the exception of iron ore, went on increasing. In 1879 the zenith of the gold production was reached, 60,155 ounces, valued at £230,895, being then extracted. Since that period the amount produced has fluctuated considerably, the lowest point being reached with 23,451 ounces in 1890. Last year this was exceeded by about 14,000 ounces. In 1888 silver made its first appearance in the returns, the value of the 417 tons then raised being set down at £5830. One hundred tons of copper were also exported at that period. The production of silver-lead ore increased gradually till 1892, but in 1893 it took an enormous bonnd, the number of tons shipped from the colony being 157,710, with a gross value of £188,520. The maximum value of the Tasmanian mineral production was reached in 1887, when the total attained was no less than £761,683 from tin and gold alone, the value of the former exceeding half a million sterling. Last year, although the quantity of tin produced was but 792 tons less than that of 1887, the value of the metal, in consequence of deprecia-

tion, came in but £245,500, and the total value of the 1893 mineral production was £599,971.

Native Methods of Working Mexican Mines.

J. Howard Palmer, B. A., in *London Mining Journal*.

Mining has been carried on in Mexico since the conquest of the country by Cortez in the 16th century, and so robust and persistent are the veins in the Guanajuato, Zacatecas and Pachuca districts that the same mines have been worked uninterruptedly and at a profit for the last 300 years, and are still producing to-day. In countries like Australia or the United States, mining is a thing of yesterday, and every mine owner has to find out for himself how he can most cheaply mine and reduce his ore without having any experience of the past to guide him. The Mexicans, however, have been miners from father to son for centuries, and in the older fields at least, their practice both underground and on the surface is very economical and peculiarly suited to the conditions of the work.

All the principal mines are situated at altitudes varying from 6000 to 8000 feet above sea level, and, as may be imagined, at such altitudes fuel, water and timber are very scarce. There is hardly any coal in Mexico, except in the extreme north, and it is generally cheaper to burn wood in boilers. On the other hand, forage is cheap, as it only costs about \$1.50 per week to keep a mule, and the Mexicans accordingly get out of the fuel difficulty by using mule and horse power instead of steam, wherever they can. Instead of modern hoisting machinery, horse whlms, or malacates, constructed entirely of wood, are still largely used, and in the reduction works the Chilean mills and arrastras are turned by mules instead of steam power, and the same animals, when they are too worn-out for anything else, serve to trample and stir up the argenteriferous mud of the tortas. The ancient method of unwatering the mines is also very curious. All workings below the water level were so planned that they drained into a central sump or reservoir. Above this sump is fixed a barrel, over which runs and endless string of buckets dipping into the water below, and discharging into another reservoir 30 feet or so above the lower one. Suitable gearing actuates the revolutions of the barrel, and the whole concern is turned by a mule. Thus by a succession of these reservoirs and trains of buckets the water is finally lifted to the surface. These clumsy and expensive arrangements have, however, nearly gone out of use in the mines, though still employed for wells and irrigation. Great bags of ox hides sewn together and slung to the cable are now the usual means of unwatering vertical shafts where there are no guides, and tonneles, or cylindrical drums of wood and galvanized iron have also been found very efficient. These tonneles are generally about three feet in diameter and ten feet long, and are fitted with a valve lifting inward, so that they can be discharged automatically when they reach the top of the shaft. Steam and Cornish pumps are gradually coming into favor, and none too soon, for most of the old Mexican mines have now to cope with such quantities of water that powerful pumping machinery is an absolute necessity for further development. There are plenty of mines in Mexico where all that is wanted for profitable working is an economical method of dealing with the water, but it generally happens that the native owners are frightened at the expense of machinery, let the water rise and lose the mine. The worst of it is, that the Mexican engine drivers and firemen, from ignorance or carelessness, will not look after their machinery, so that breakdowns of hoisting gear or disastrous boiler explosions are far too common, and these accidents keep up the prejudice against machinery in the conservative minds of the Mexican mine owners.

The way in which the Mexicans often treat machinery is simply disgraceful, and it is not too much to say that many of their failures in deep mining are entirely due to neglect of hoisting or pumping plant. Inspection by Government authority has never been dreamt of, and the consequence is that boilers are allowed to choke up with scale, and leaky joints and burnt and pitted plates go from bad to worse until the inevitable disaster occurs. Then, of course, the unfortunate fireman is to blame, although with proper care and inspection the accident need never have happened. Another serious drawback to the employment of machinery in Mexico is the scarcity of skilled mechanics. If an engine or boiler goes wrong, the Mexicans are generally helpless to do the necessary repairs, and have to send to the nearest English mining company or railway for assistance. The fact is that the Mexican engineers are excellent miners in their way, but poor mechanics, and it is not to be wondered at that many mines are suffering from the reluctance of their proprietors to incur the risk and expense of the machinery necessary to set them going again.

It is in underground work, however, that the Mexicans exhibit their best, and though some of their methods are not perhaps so scientific as they might be, they are eminently economical and adapted to the conditions of the

mines. Adits are preferred to shafts, at any rate until the value of a lode is proved, for the Mexicans emphatically do not believe in sinking a vertical shaft through the country rock to cut a vein at so many meters down, however promising the outcrop may be, nor are they fond of driving an adit across the strike of a lode. The usual way of opening up a new vein is by driving an adit along the vein from the outcrop, of course as low down in the hillside as possible; when an ore body is found a shaft is sunk either from the level of the adit or from the surface, as the case may demand. Where hoisting is either slow or costly, shaft sinking costs from \$100 to \$200 per meter, against \$20 to \$40 per meter for drifting, and the Mexicans will not find the money for the former. When they do sink shafts, they are generally in payable ore all the time. If the configuration of the ground is unfavorable for an adit, they sink an inclined shaft upon the outcrop, always following the vein, with the result that the shaft gets as crooked as a dog's hind leg, if the dip is at all variable. They are by no means fond of working through country rock, but they will follow a vein forever, however barren and weak it may be, with wonderful patience. In Guanajuata especially, the lodes are very "pockety," and a small and disintegrated vein often suddenly widens out into a great ore body. In this district one tunnel was persevered in for 11 years, the vein being nearly barren during all this period. At last, however, when nearly a mile and a half had been driven, a bonanza was reached, producing more than a million sterling. In this case, at any rate, the policy of persistently following up the lode paid well. Some of these old Mexican adits are curious affairs. One that the writer remembers had evidently been begun 300 years ago, when the Spaniards first came into the country, when powder was too expensive to use for blasting. Just at the month there were still to be seen the traces of fires which had been lighted to crack the rock in lieu of blasting it, and inside were the relics of a tramway with wooden rails, which was probably older than Trevethick or Watt. With nothing more besides these primitive appliances, this mine in the last century produced \$30,000 to \$40,000 a week, nine-tenths of which would probably be clear profit.

Diamonds in Australia.

Albert F. Calvert, F. R. G. S., in London *Mining Journal*.

Owing to the number of reports that are at present being published as to the existence of the diamonds of Australia, a few words as to the fact may be of interest to your readers.

Referring to Mr. John Calvert's explorations in Australia in the early days, I am enabled to state that the diamonds of Australia owe their origin to three different sources, the oldest from the crystallization of carboniferous matter between the diorite or greenstone dykes and the quartzose reefs. This would take place near the surface and would, mostly, be long since denuded by the floods and rainfalls, being mixed with the detritus which has been washed down and accumulated from the higher lands. The second would be the overlapping of the basalts over the accumulations, formed by ancient river beds, and the heat of the basalts would be sufficient to make the conglomerates in which the diamond has been found, in many different parts of the world, more especially in India and Brazil. The last condition would be the extinction of some active volcano, the dying struggles of which would draw portions of the surrounding country into the vortex of the crater. The molten matter would then be partially thrown out, and, again and again being filled in, would at last settle down. The actual combustion ceasing, the fire would die out and a fresh set of circumstances set up. We should then have a huge basin filled with conglomerates, shales and schists, partially converted into clays more or less sprinkled with fragments of rocks of the surrounding country.

Now, the center of this accumulated debris would be of a lower temperature than the walls of the basin, which would retain their heat for some time. The hydrocarbons, which previously had been consumed, would now permeate throughout, and under pressure, together with the currents set up, the carbons would crystallize, and veritable diamonds would be the result. In Mr. John Calvert's field books he has several localities of diamondiferous conglomerates laid down, some accompanied by sketches of the districts. From his, and my own investigations, I consider Western and South Australia will give the richest and most productive mines, whereas Victoria, New South Wales and Queensland will come next in richness. The Bingara diamond fields belong to the second class, viz., the overlapping of the detritus of the ancient river (most likely the Horton) by the basalt. A portion has been denuded, leaving the diamonds in some parts practically on the surface, or within a few inches. This ancient detritus is composed of pebbles, white quartz, jasper, chalcedony, fragments of Devonian sandstones and upper Silurian shales, associated with rounded masses of corundum, sapphire, and black

tonmeline, also occasional zircons, and, very rarely, rubies and other precious stones; also magnetic iron with occasionally scales of gold adhering, and silicified fragments of various woods. These are occasionally interstratified with sand, and here and there beds of pipe-clay, and, where the basalts have been most active, patches of silicious or ferruginous conglomerate. Notwithstanding this tempting bill of fare I should recommend it with great caution to the speculating public, as, although the diamonds are indisputably there, yet there are many drawbacks and obstacles before the dividend would reach the pockets of the ever-confident shareholder. If he wants a veritable paying Australian diamond mine, let there be selected one of the pipes of the ancient craters, where the diamondiferous debris would be more largely impregnated with the glittering gem, and where the area of nature's operations is more concentrated.

Geological Maps of Mining Regions.

A Washington dispatch says Director Powell of the Geological Survey has turned the survey into a popular channel by planning a series of topographical and geological maps of the United States. Among these are maps of the gold belts of California, two of which are nearly ready for distribution. These are known as the Sacramento and Placerville sheets, and cover an area extending from the plane of the Sacramento valley to the foothills of the Sierra Nevada, a distance of nearly 40 miles.

To the gold-hunters of the West these maps will be of the greatest assistance. Their work at present is far from attractive. Although the annual output of gold in the world has been constantly increasing in the last eight years, that of the United States has decreased gradually since 1853, when it attained its highest figures—\$65,000,000. In 1892 the gold product of this country was estimated at \$33,000,000. The value of all the gold mined in the world that year was placed at \$130,817,000. Last year the world's product increased to \$146,000,000, but that of the United States is not far from the total of 1892.

The difficulties in the way of mining gold in this country have increased each year. In the early days of gold mining much of the precious metal was found in the beds of rivers and in rocks which had been forced to the earth's surface by volcanic action. On the western slope of the Sierras in California, where the original discovery of placer deposits in the United States was made, the topographical conditions were favorable to the concentration of gravel detrital material, resulting from the disintegration of gold-bearing rocks into hodies that could readily be worked by the aid of abundant water.

The increasing difficulty and the cost of gold mining in the United States drove the seekers after the metal away from the streams into the mountains. They had nothing to guide them but the experience gained in placer mining, and thousands of them eventually gave up the struggle. Some of them succeeded in discovering rich veins and in time capital came to their aid.

It will be seen that if these prospectors had possessed the information which the Geological Survey has now set out to provide, their task would have been far easier.

Instead of a haphazard search for gold-bearing rock, they would have been able to continue their search for wealth in a thoroughly business-like way. The most ignorant prospector would have been placed practically on an equality with the experienced metallurgist. The change in methods which this mapping of the auriferous deposits of the country will bring about is typical of the general change which has been taking place in connection with western conquests of the soil.

Observations on Ore Dressing.

Discussion by T. A. Rickard of paper read before International Engineering Congress by O. O. Bilharz on Ore Dressing.

The observations made by the author concerning the treatment of gold-bearing ores, deal with the subject only briefly and in a general way; but, coming from an authority, they invite comment.

In stating the fact that a "finely divided condition" is a necessary characteristic of ores containing free gold, the author must be referring to those mining districts only with which he himself is acquainted. The statement would not be true of certain gold-mining regions in America and Australia. The ores of some Californian mines and the mill-stuff treated at certain of the mills of Clunes and Ballarat in Australia, and of Otago in New Zealand, contain the gold in a free but in a coarse state. Moreover, "reduction to fine sand and flour" is not required by certain ores, even though the gold be in a finely divided condition. In such cases the ore becomes detached from the quartz before the gangue has been pulverized into particles as small as that in which the ore occurs.

The dry crushing of free-milling gold ores is unknown in

the new mining regions of the world. It is not clear whether the author has in mind any European district in which such a process is in actual use. If he has, a description of the method and results obtained would be very valuable. Dry crushing is, other things being equal, twice as slow and twice as expensive as wet crushing. In the case of free milling gold quartz it serves no purpose, since such ore does not carry sulphides which contain any large percentage of value, and which, by being slimed, may carry away part of that value. The dry crushing of a free-milling gold quartz would be considered an absurdity by an American metallurgist.

If the ore contain "free gold only," why submit it to a further treatment, such as concentration, after its passage over the amalgamating plate? What does the author propose to concentrate?

Coming to the consideration of the treatment to be given to ores containing the gold in close association with metallic sulphides, the author requires that it be treated by successive stages. He probably refers to crushing with rolls. As a general proposition, it would seem to me that the reverse is more nearly true, and that crushing is to be avoided as far as possible, as tending immediately to make slimes, the formation of which is the most potent cause of the loss of gold. Why anticipate the treatment of tailings by the MacArthur-Forrest or some other process? The satisfaction felt by a mill man in saving gold by a subsequent treatment of the tailings from his mill appears to me to be like that of the man who shoots at a rabbit, and having missed with the first barrel, gets it with the second. The one is no proof of good marksmanship, neither is the other of good milling.

Road Drainage.

At the Good Roads Congress held in Chicago in October, J. J. W. Billingsley read a paper upon the subject of Drainage which in the main is correct when he says:

Among those who have given the subject of road improvement careful attention, there is settled conviction that the good condition of any road depends upon a system of thorough drainage—a system which embraces not only the removal of the storm water which falls upon the surface of the road and the land adjoining, but also the water which filters through the ground. The latter, if allowed to percolate into and through the subsoil underlying the roadbed, will render the travelway soft and springy, often affecting the compacted surface of the road so as to cause it to break up, or, in other words, "the bottom drops out."

In fact, the basis of all road improvement in this country is the thorough drainage of the road surface and the foundations of the roadbed. In the experiments which have been made in road drainage by laying one or two lines of tile drains along the sides and parallel with the road, the result has been so satisfactory that some persons have become enthused with this method of road improvement and conclude that in it there is a remedy for all the defects which may be encountered. But we are convinced that the best improvement of our highways will combine at least three essential features, which are:

A road embankment of sufficient height to be at least above overflow from extraordinary rainfalls and sufficiently crowning to shed the water readily and wide enough to accommodate the travel, and not of greater width; that the road shall have open ditches on each side of sufficient capacity to carry all flood-water from the roadway and from the lands adjoining into the nearest water course; the surface or open ditches should have such a perfect grade that no water will find a lodgement along the line of the road on either side and that two lines of tile drains be placed parallel with the road, one on each side, at the base of the embankment.

The underdrains should be laid at the depth of three or more feet. The size of the tile will depend on the length of the drain and the fall, but it is probable that they should not be less than four inches in diameter in any case, and as much larger as the needs may require. The three essential features named embrace two systems—one the removal of the surface water speedily and effectually, the other the removal of the water of saturation remaining after the removal of the surface water, and the prevention of the flow of soil water under the roadbed. The underdrains should have a uniform descent or grade to some natural stream or outlet where the water discharged will flow away freely and at no time back up in the drain. The crowning of the road should be sufficient to cause the water falling upon the surface of the road to flow readily to the side ditches. If it fails to flow away, and remains in the ruts and depressions, it will increase the amount of mud and the inconvenience of travel. Roads in such a condition should have road machines passed over them as often as necessary to make the roads level.

It is a mistaken idea that an underdrain laid in the

middle of the road will drain the surface of the road. The travel and the action of the water falling upon the road will so effectually puddle the surface that no water on the road will find its way down to the drain thus laid. To the contrary, the horse tracks and ruts will hold water like earthen vessels until it is removed by evaporation or otherwise. Roads graded and drained as proposed will cost from \$400 to \$500 per mile, but when done they will be good roads for eleven months and commendably passable the remainder of the year with a little timely repair. Where gravel and stone are not to be had at a reasonable cost, we know of no improvement so satisfactory in all respects as

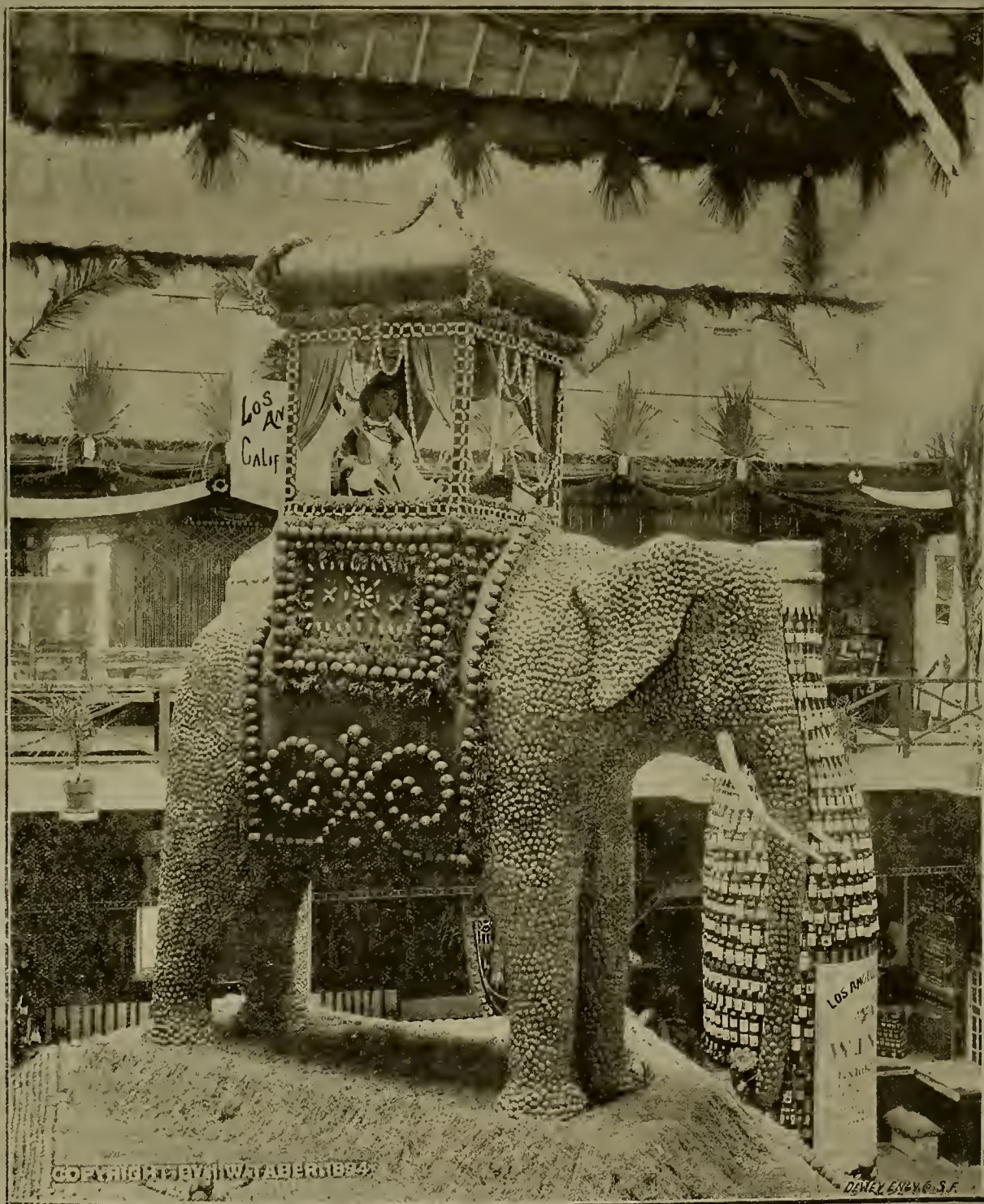
tile with gravel or sand a few feet, so that surface water may pass down freely into the underdrain to prevent its accumulation where it is likely to affect the road embankment.

After a road has been put in good condition and thoroughly underdrained, nothing need be done except a little timely repair in the way of keeping the surface smooth and the open ditches free from any drift accumulation. Road drainage has passed the experimental stage. The benefits have been fully proven. The success of the improvements depends only upon the thoroughness of the work. A few suggestions as to the construction of the underdrains may

that no more important duty lies before us to-day the effect of which will be more widely felt than that of giving material aid and to otherwise encourage the permanent improvement of our public highways.

A Walnut Elephant.

One of the unique features at the Midwinter Fair is the Los Angeles walnut elephant, in the Southern California building. It stands on a platform 12 feet square and 15 feet high, with supporting wings six feet square and eight feet high, representing a triumphal arch. The archway is



THE LOS ANGELES WALNUT ELEPHANT AT THE MIDWINTER FAIR.

the road well graded and sufficiently drained. Where gravel or broken stone can be had, it will be found that the thorough drainage of the road, as proposed, will save half the gravel or stone that would otherwise be required to make a good road. A dry foundation to build upon is the most important factor in road construction. Tile drains may be used to intercept water percolating through the earth of the higher ground adjacent and likely to interfere with the road, or springs or seepy places under the roadbed may be drained out with tiles so as not to interfere with the embankment. It may be found advisable at some points along the line of the drains to fill in above the

he helpful in this connection. One of the most important features of a good drain is a desirable grade—one free from depressions below or rises above a true grade line. These conditions, it has been remarked, are never secured without effort; slight depressions will fill with silt sooner or later, and so far destroy the efficiency of the drain. The tiles should be laid in a trench carefully fitted for them, and so carefully settled in their bed that the filling of the ditch will not displace them, and the joints should be closely joined; and if any difficulty is experienced from quicksand, the covering of the joints with clay will prevent any trouble from this source. In conclusion, we remark

supported by four glass jars, 36 inches high, and filled with varieties of citrus fruits, representing pillars or columns, the interior of the arch and the outside of the whole structure are covered with 15,000 oranges of the best quality of Washington navels. Upon this structure of oranges, lemons and other fruits stands this life-size elephant. It is an astonishing piece of work, and the task of placing 1000 pounds of walnuts on the skeleton of the animal to form his hide is realized to have been a very tedious one. The saddle-cloth, howdah and trappings are outlined in citrus fruits, peannts and corn; the passenger is a young lady of wax.

Mechanical Progress.

Manufacture of Pins.

The machine that makes pins turns out 75,000 of these tiny essentials in an hour. Before the pin is finished it goes through very many different operations, which are described in the *Youth's Companion* as follows: A reel of wire hangs over the machine, the free end of which passes between two rollers.

As the wire leaves the rollers it passes between two matched dies until it touches a gauge. Just as it does this the dies come together and clamp it firmly in a groove in their face. At the same time the machine cuts it off the proper length.

The gauge then moves away, and a little punch forms the head by striking the end which rested against the gauge. When this is finished, the dies separate and deliver the pin into one of a great many grooves in the face of a wheel about a foot in diameter, as wide across its face as the pin is long. When the pin is taken by the wheel it has no point; but as the wheel turns it rubs the pins against an outside band, which causes each one to roll in its groove, and at the same time carries them past a set of rapidly moving files, which rub against the rough ends and sharpen them roughly.

They next pass against the faces of two grinding wheels, which smooth the points, and then to a rapidly moving leather band having fine emery glued on its face. This gives them the final polish; and as they leave the band they are dropped into a box underneath the machine.

After this the pins are plated with tin to give them a bright, silvery appearance. They are prepared for plating by being first immersed in weak sulphuric acid, to remove all grease, and then dried by being placed—a bushel or so at a time, with about the same quantity of sawdust—in a machine called a tumbling barrel.

This is simply a cask suspended on a shaft, which passes through it lengthwise. Two or three hours' rolling in sawdust cleans the pins and wears away any little roughness which the machine may have caused.

Pins and sawdust are taken together from the barrel and allowed to fall in a steady stream through a blast of air. The sawdust being the lightest, it is blown over into a large, room-like box, while the pins, being heavier, fall into a bin below. After this they are spread out in trays having sheets of zinc in their bottoms, which have been previously connected with one of the wires of an electric battery. The trays are then placed in a tank containing a solution of tin in muriatic acid, and the other wire of the battery is inserted in the solution. Electrical action immediately begins, and deposits metallic tin on the entire surface of each pin.

They are then washed in a tank of water and put into other tumbling barrels with hot sawdust. When they have been dried and cleaned of the sawdust, as in the former instance, they are put into a large, slowly revolving copper-lined tub, which is tilted at an angle of about 45°. As this revolves, the pins keep sliding down the smooth copper to the lower side. This constant rubbing against the tub and against each other polishes them.

It was the practice formerly to allow pins of all lengths to become mixed in the different operations, and after polishing to separate them by a very ingenious machine; but it has been found more economical to keep each size to itself.

From the polishing tub the pins are carried to the "sticker," where they fall from a hopper on an inclined plane in which are a number of slits. The pins catch in these slits, and, hanging by their heads, slide down the incline to the apparatus which inserts them in the paper.

As the number of pins in a row on the paper and the number of slits are the same, an entire row is stuck at once by an ingenious device, which takes one pin from each slit and inserts them all at once in the two ridges which have been crimped in the paper by a wheel that holds it in place to receive the pins.

At the same time this wheel crimps the paper it spaces the rows so that when filled with pins the paper will fold up properly.

This whole machine is so delicate in its action that a single bent or otherwise imperfect pin will cause the machine to stop feeding until the attendant removes it; yet its operation is so rapid that one machine will stick 90,000 pins an hour.

As the long strip of paper on which the pins are stuck comes from the machine, it is cut into proper lengths by girls, who then fold and pack the papers in bundles ready for shipment.

How to Silver Glass.

I have frequently noticed, says a correspondent of the *Scientific American*, under the heading "Silvering Glass," various silvering solutions, such as are used in the plating of mirrors; and as I have tried each one of them myself and attained results far from satisfactory, I beg to send herewith formula for a silvering solution which contains only a small percentage of silver compared with others which I have unsuccessfully tried, and which will invariably produce excellent mirrors, provided the following conditions are adhered to:

1. Pure chemicals.
2. Have the glass chemically clean.
3. Adhere strictly to the formula.

And I trust that readers who have been endeavoring to silver glass with the other solutions heretofore given will advise you of the superiority of the following:

1. *Solution.*—Dissolve $2\frac{1}{2}$ drachms nitrate of silver (crystals) in two ounces of water, and add concentrated liquid ammonia, drop by drop, until the brown precipitate formed is nearly, but not quite, all dissolved; then add 24 ounces water and filter three times.

2. *Reducing Solution.*—Dissolve $1\frac{1}{2}$ drachms nitrate of silver in 24 ounces of water; then take one ounce of water in a graduate and dissolve in it 30 grains white caustic potash, and add this to the 24 ounces of solution just mentioned; then add 420 grains Rochelle salts. Filter three times.

Note.—Solution No. 2 will be found to have a heavy black precipitate, and it is necessary to filter same until it is perfectly clear, which can be accomplished by having three funnels one above another, with filtering cotton packed in rather tightly.

Use distilled water.

To use the above solutions, mix equal parts of No. 1 and No. 2 together, and flow over the glass, which, however, must be in a room heated to about 90 or 100 degrees F.

We have tested the formula printed above and find that it gives excellent results. Two parts of No. 1 to one part of No. 2 by measure gave better results than equal parts. The glass should be cleaned with caustic potash dissolved in water and should be thoroughly rinsed before silvering. The process of silvering can be hastened by having a steam table on which to lay the plate of glass over which the combined solutions have been poured. A gas stove or an oven may be used. Small pieces of glass can be silvered in one to two minutes by holding them a few inches above the flame of a Bunsen burner. Defective spots may be remedied by removing the silvering around the spot with nitric acid and resilvering. If the hands become stained with the solution, rub the stains with a crystal of resublimed iodine until the color begins to change, then sponge with alcohol. Only small pieces of glass should be attempted at first until the method of working the process is well understood.—Ed. Scientific American.

Production of Color in Glass.

The beautiful coloring of certain varieties of glass now produced in Germany, and which far excels some of the most noted French specimens, is, according to *Die Glashutte*, accomplished by the glassblower at the furnace, by means of an apparatus consisting of a sheet-iron cylinder, 20 inches long and 8 inches diameter, standing vertically and having a similar cylinder riveted across the top, thus forming a T-shaped muffle. In the lower cylinder is an opening into which an iron ladle can pass, and the horizontal cylinder is provided with doors at either end, the one nearest the operator being so arranged that the blowpipes can be supported when the door is closed in a horizontal split running to its middle, the object to be treated being held inside. While the glassblower is reheating his work for the

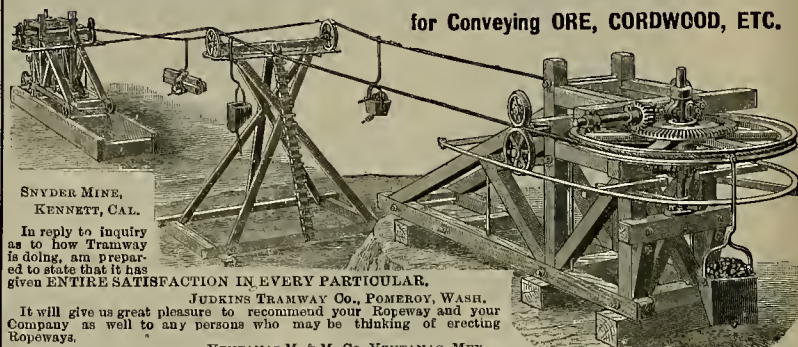
last time in the furnace, an attendant takes the long-handled iron ladle, which has been heated red hot, shakes into it about a spoonful of a specially prepared chemical mixture, and places the bowl of the ladle quickly in the opening provided for it in the vertical cylinder. The mixture immediately gives off vapor, which rises to the horizontal cylinders, where meanwhile the blower has placed his work, supported by the blowpipe, and heated to an even red, turning it rapidly in the vapor. In a short time the object is covered with a changeable luster, is removed from the pipe and tempered like other ware in an ordinary oven, then cut, engraved painted or gilded, as desired.

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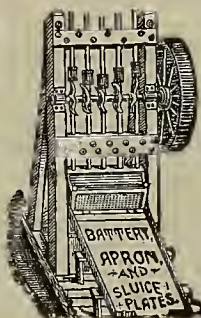
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Scientific Progress.

Was There a Flood?

One of the largest meetings ever held by the Victoria Institute of London, England, took place in the third week of March to hear that well-known "Nestor among Geologists," Prof. Prestwich, F. R. S., read a paper on "A Possible Cause for the Origin of the Tradition of the Flood," in which he proposed to treat the subject "from a purely scientific standpoint." The chair was taken by the ex-president of the Royal Society, Sir George Stokes, Bart., F. R. S., the present occupant of that professional chair at Cambridge University once occupied by Sir Isaac Newton, and also the president of the Victoria Institute, whose aim is to investigate all scientific questions bearing on the truth of the Bible, and to associate all scientific men, and people generally, in the colonies and America, in aid of this work. The business was commenced by Capt. F. Petrie, the honorary secretary, reading a letter from the Duke of Argyll, who was unable to be present, after which Prof. T. Rupert Jones, F. R. S., read the paper prepared by Prof. Prestwich, he not being sufficiently recovered from a severe cold to do so himself. In it the author described at considerable length the various phenomena which had come under his observation during long years of geological research in Europe and the coasts of the Mediterranean. Among these he specially referred to having found the flints of the drift to be of two classes—one with bones of animals, carved, and interspersed with the remains of man, and the other, which he termed the Rubble-drift, containing bones of animals of all ages and kinds in vast heaps. He cited the confirmatory opinions on this point of Prof. Geikie, F. R. S., a member of the Institute, and drew special attention to the geological surroundings of these strange deposits and the manner in which the bones were found. He then referred to phenomena in regard to raised sea beaches, and the constant occurrence of "head," the large masses of transported rock, loam and loess, covering the high plains in Hungary and southern Russia, and the ossiferous breccias in various localities.

From the circumstances attending these and their surroundings, he said he had been forced to the conclusion that all their phenomena were "only explicable upon the hypothesis of a widespread and short submergence followed by early re-elevation, and this hypothesis satisfied all the important conditions of the problem," which forced one to recognize that there had been a submergence of continental dimensions. The age of Man was held to be divided into Palaeolithic and Neolithic, and he considered rightly so. He concluded by suggesting that thus there seemed cause for the origin of a tradition of a flood.

The paper was followed by reference to a communication from Sir W. Dawson, F. R. S., who welcomed the paper as confirming his conclusion come to on geological and palaeontological grounds of a physical break in the anthropic age. The evidence of this was afforded by the cave remains and from a vast quantity of other sources. The discussion which ensued was commenced by Sir George Stokes, Bart., F. R. S., referring to the great value of the author's contribution to our knowledge and right understanding of the phenomena he had so long studied. Among those present were Mr. Haddleston, F. R. S., the past president of the Geological Society, and Dr. Woodward, F. R. S., the present president. The latter proposed a cordial vote of thanks to his friend and teacher, Dr. Prestwich, "the Nestor among Geologists," whose contributions to our knowledge of that science were recognized by all as greater, more far-reaching and more valuable than those of any other in the present century. After

sundry other remarks, Sir Henry Howorth, Bart., F. R. S., spoke, urging the the great importance of recognizing the value of the arguments in the paper and many others which had come under his own observation in Asia. Prof. McK. Hughes, F. R. S., of Cambridge University, followed with some criticisms, and bore warm testimony to the value of the paper, after which Prof. Hall, F. R. S., late director of the Geological Survey of Ireland, spoke strongly in favor of the scientific nature of the author's arguments. Prof. Rupert Jones, F. R. S., in a few sentences replied to the speakers, and the gathering dispersed.

Leonard Smokeless Powders.

The ingredients of the Leonard powder, according to the patent specifications, for the United States 30-caliber rifle are given as follows:

150 parts by weight of nitroglycerine.
50 parts by weight of gun cotton,
10 parts by weight of lycopodium.
4 parts by weight of finely triturated urea crystals,
but the proportions are varied according to the caliber of the gun which is to use it.

If dinitrobenzol be employed in the manufacture instead of finely triturated urea crystals, a similar quantity, namely, four parts, should be used. The several ingredients named above are first mixed together, and there is then introduced as a solvent either acetone alone or acetone combined with acetic ether. The solvent is evaporated by agitation, and the material is formed into a cake or granules by pressing in molds. The analysis of cordite, which we give for the sake of comparison, is as follows:

Gun cotton as previously used at Wallbam Abbey	37 parts
Nitroglycerine	58 "
Vaseline	5 "
Total	100 "

The solvent here used is again acetone, the proportion being 19.2 parts. The mixture is incorporated for three and one-half hours, and is then squeezed into threads. If the "scouring" and "pitting" actions which accompany the use of cordite are obliterated in the "Leonard" powder, the *Scientific American* thinks a bright future is before it.

The Geologic Age of the World.

Prof. C. D. Walcott expresses the opinion—contrary to that entertained by some scientists—that geologic time is not to be measured by hundreds of millions of years, but simply by tens of millions. This is widely different from the conclusion arrived at by Sir Charles Lyell, says the *Scientific American*, who, basing his estimate on modifications of certain specimens of marine life, assigned two hundred and forty millions of years as the required geologic period; Darwin claimed two hundred million years; Crowell, about seventy-two millions; Geikie, from seventy-three million upward; Alexander Winchell, but three million, while McGee, Upham and other recent authorities claim from one hundred million up to six hundred and eighty million. The data presented by Dr. Walcott, showing the distribution of geologic time, or the different periods of sedimentary rocks, give two million nine hundred thousand years for the cenozoic and pleistocene, seven million two hundred and forty thousand for the mesozoic, seventeen million five hundred thousand for the paleozoic, and a like period to the latter for the algonkian—a total of forty-five million five hundred thousand years.

Nicotine in Tobacco.

Dr. G. B. De Toni, Venice, has published the results of histochemical researches on *Nicotiana Tabacum* and other species of the genus. He finds the alkaloid, C₁₀H₁₄N₂, to be located chiefly in the epidermal tissues. It is absent from the seed and the young plant. In the root of the mature plant it occurs in the cortical tissue, and especially in the layer of cells immediately beneath the epidermis. In the branches, leaf stalk, lamina of the leaf, peduncle, calyx and

corolla it is almost entirely confined to the epidermal cells, and occurs especially in those at the base of the hairs. It is found also, in smaller quantities, in the anthers and pistil. The mesophyll and assimilating tissue of the leaf gave uniformly negative results. Nicotine does not appear to exercise any protective influence on the tobacco plant, since both the fresh and dried leaves are devoured by many insects. The author believes its function to be simply excretory; it is a product of the reduction of oxygenous substances. The following are given as the best chemical tests for nicotine: The double iodide of potassium and mercury; iodized iodide of potassium; tannic acid; tetrachloride of platinum; iodized iodic acid; Dragendorff's reagent; trichloride of gold.

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The work is divided into four parts—Rocks, Veins, Testing and Assaying. The geological chapters are intended to give miners a practical idea of the various formations. The chapters on mineral veins are derived from long observation, and the section on exploration has been carefully considered. All that relates to discrimination and assay of minerals has been kept as free from formulas as possible. The work is written for practical men, and all the explanations and descriptions are clear and to the point. It is so prepared that it is useful to uneducated men as well as scientists.

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In a paper by W. S. Hadaway, Jr., a short time since, he says:

A well-designed central station of moderate size produces a horse-power hour by the combustion of about three pounds of good coal. The electrical horse-power hour developed by this coal has 2565 heat units; we have to balance these 2565 heat units in the concentrated form against 42,000 heat units existent in the three pounds of coal in a more diffused state, and determine whether, for heat purposes, the difference in the form of the energy, with its enormous attendant losses, compensates for the energy lost in bringing the heat units of coal into the higher form of energy capable of economical transmission to a distance.

It is found in practice that the commercial efficiency of the coal-cooking range is somewhere between three and six per cent; these limits are stated by Tyndall. In a recent discussion before the London Society of Engineers, Nov. 6, 1893, Mr. Beaumont gives the efficiency of the cooking range from experiments of his own as 3.7 per cent, or, roughly, four per cent, indicating that of every 27 pounds of coal burned, 26 pounds are thrown away. We have seen that the heat efficiency of the average moderate size central station is about six per cent. There is sufficient margin between a heat efficiency of 3.7 per cent and one of six per cent to warrant the use of electricity as a source of heat in domestic life, and a further extension with apparatus of larger size and higher working economy would give a still greater margin between coal burned under the boiler and that used in the firepot of the range. Thus with the use of only $1\frac{1}{2}$ pounds of coal per horse-power hour he would secure a commercial efficiency of 12.2 per cent, or 3.3 times the efficiency of the range.

At the outset, of course, the cost of electrical energy as fuel under average conditions at the power rate will be greater than fuel directly burned. But there are compensating advantages gained which more than offset the additional cost. This has been abundantly proved in actual practice. The saving of attendance and of time, freedom from dirt, coolness of the kitchen, absolute uniformity of heat and ability to regulate it, appeal at once to the householder. There is merit aside from novelty in such practice.

In industrial work, wherever flames are used to secure localized heat, electricity can be advantageously employed. It is more easily regulated than flame, there are no unhealthy products of combustion, the mean temperature of the shop is lowered, the temperatures are constant, the work is more uniform, and the entire system cleaner and more complete. For factory use it is the most desirable form of fuel. In laundries, clothing manufactories, hat factories, silk and all textile fabric mills, shirt factories, rubber-goods manufactories, furniture factories, etc., are good fields for the use of electricity for heating. In domestic life no source of heat offers so many elements of value as the use of electricity for cooking and laundry work. There is no discomfort, no noxious gases from combustion, and the temperatures attained are constant, so that the question of the discretion of the cook is eliminated, and better results obtained than can possibly be reached from the approximate temperatures of surfaces heated by combustion. It may be fairly stated that people who could afford to do their lighting by electricity could afford to do their cooking and ironing by the same means.

Electricity for heating will be found of the same value to central-station electric-lighting companies as the use of gas for fuel purposes has proved to the gas-lighting companies. Its value lies largely in ability to localize the heat, and it will not be found

desirable to use it on a large scale where diffused heat is wanted. High temperatures and small quantities are the proper uses for electricity for fuel.

Perpetual Lightning.

The phenomenon known as lightning, followed by a rolling, reverberating report, recognized as thunder, is common to a wide zone of the earth, but it is not generally known that there are localities where the vivid flashes and the deafening peals are incessant, says a technical exchange. The most notable of these continuous lightning districts is on the eastern coast of the island of San Domingo, a leading member of the group of the West Indies. It is not meant that the lightning is here continuous the year round, but that, with the commencement of the rainy season, comes the zig-zag feature of the electric illumination, which is then continuous day and night for weeks. The storm center is not continuously local, but shifts over a considerable area, and, as thunder is seldom heard over a greater distance than eight miles, and the lightning to the night will illuminate so as to be seen 30 miles, there may be days in some localities where the twinkle on the sky is in a continuous succession while the rolling reports are absent. Then again come days and nights when the electric artillery is piercing in its detonations, and especially is this the case when two separate local cloud centers join, as it were, in an electric duel, and, as sometimes occurs, a third participant appears to add to the elemental warfare. Then there is a blazing sky with blinding vividness and stunning peals that seem to pin the listener to the earth. Long before the echoes can die away come others, until the auricular mechanism seems hammered into chaos.

Just how and why it is that there is here generated so immense an amount of electricity as to keep up such an incessant ignition is one of those problems that can only be solved when sufficient data are at hand to work upon. It is probable that, with the commencement of the rainy season, this region is the border of opposing air and ocean currents whose friction has something to do in the case. This would tend to bring into contact opposing clouds variously charged, and as lightning is the passing of electricity from one cloud to another, seeking equilibrium, or the passing of the fluid from a cloud to the earth, it is probable that, in this continued friction of currents, may be found a starting point to unravel the mystery. It is in swirling and opposing cloud strata, especially where these get into gyratory motion, that electrical phenomena are most abundant, just as, in an even, uniform flow of clouds, such disturbance is rarer and often entirely absent.

Artificial Light Without Shadows.

B. A. Dobson, at a recent meeting of the Institute of Mechanical Engineers, London, read a very interesting paper upon the best method of artificially lighting workshops and other places where the incandescent lamp is a too expensive form of light and where the arc light, as ordinarily used, is unsuitable on account of the sharp shadows it casts. To sum up his paper in a few words he found that the most satisfactory results were obtained by reversing the current in an ordinary arc lamp, producing a crater in the lower carbon and projecting the light up against a whitewashed ceiling from where it was diffused throughout the room, instead of the usual method of producing the crater in the upper carbon and projecting the light downward directly upon the work from the very small point of illumination offered by the electric arc.

The plan suggested by Mr. Dobson is by no means a new one, and the sun lamp, invented many years ago and extensively used in Paris, worked on a similar plan. In this lamp carbons were placed at an obtuse

angle on top of a block of marble and the arc played across the surface of the stone, producing a light similar to the calcium light used for theatrical effects. The marble was opaque and the light was projected against the ceiling and the room was filled with a soft yet bright light somewhat like daylight. The old sun lamp would be regarded as a pretty bad lamp nowadays, for mechanically it was imperfect, but any one who remembers seeing it in operation cannot but think that a better application of the same principle will some day solve the problem of interior illumination by the arc system.

Useful Information.

A Precaution Against Consumption.

It is now pretty well established that tuberculosis is an infective disease, and if this is true, it is largely preventable. We believe that in this country especially there is not sufficient stress laid upon the communicability of consumption; the people are too apt to regard our climate (southern California) as Nature's panacea. Phthisical patients fairly swarm upon us every winter, poisoning our hotels, our streets and our dwellings. The inspissated sputum retains, according to Sawisky, its virulence two and a half months. Here, since the advent of the ooe-lunged Yankee, children die of meningitis and youth of consumption. This we are told by some to regard as the unfathomable dispensation of a wise Providence, when it rather should be charged to the criminal negligence of an easy-going public.

Persistent and systematic precautions ought to be taken by both public officials and the people in general to stop this scourge. The health department should issue stringent orders, classifying this disease among those usually placarded.

The room occupied by a consumptive should receive as thorough a disinfection as the one used by a diphtheritic patient. If the phthisical patient died within a week or two, the quarantine should be demanded and carried out. If the public really thought consumption "catching," they would regard it just as natural to take precautions against its spread as it is to stamp out leprosy. In point of fact, there is no comparison between the contagiousness of these diseases—tuberculosis being much more communicable. A campaign of education is needed.

All tuberculosis patients should be compelled for the public good to use spit cups. Public spittoons filled with sawdust or other matter easily combustible should be placed at convenient intervals. The American has been described as a spitting animal, but he must be trained to spit by law only in specially prepared receptacles. The old college saying, "Those who expectorate on the floor cannot expect to rate as gentlemen," should be impressed upon all.

Then, again, the dust of the streets ought to be removed frequently, but only after a thorough sprinkling. Public hospitals for the tuberculosis poor ought to be established. In the present state of affairs only a very few of the worst cases are treated—while thousands wander about the city polluting the very air with the germs of the greatest scourge that has ever afflicted mankind.

Hygienic treatment should be advised in all cases. Preventive medicine is no longer the medicine of the future, but the medicine of to-day. Let us follow the example of Michigan, and officially declare consumption a contagious disease. Another point of great importance is the denying to consumptives the privilege of engaging in occupations whereby they may endanger the life or health of others.

The sanitary inspection of cattle and condemnation of tuberculosis cows should be

rigidly enforced. Indeed, did our government take half the interest in preventing disease among human beings that it does in looking after the health of hogs and cattle, there would be thousands of lives saved annually.—Southern California Practitioner.

Effect of Fire on Concrete.

Concrete is often used as a fireproof building material, and as such, says the *Architect and Builder*, is commonly considered a safe material for walls or foundations which may be built for that purpose. A few experiments will demonstrate its unreliability in that respect. Take a piece of dry and hardened concrete work, such as is used in walls or foundations, and break it into three parts or lumps, leave one in its original state, and place the other two pieces in the fire, where they should remain at a light red heat for five to fifteen minutes, according to size; then remove both pieces, place one to cool naturally and the other in water to cool. When cold and removed, it will be found that the one naturally cooled will crumble easily and the one cooled in water will crack and fall apart with very slight pressure.

Some two years ago we had an experience with concrete walls, where the interior of a two-story building had been destroyed by fire. We recommended that the walls be taken down and rebuilt; but it was decided to repair them. Where the fire was light, but little damage was done; but near the base of the walls, where the hurroing braods had fallen and the fire generated the greatest heat, was a strip all round that had crumbled away, leaving the walls at this point only about half their original thickness. The most pronounced of the disintegrated concrete work was cut out and brick work built in; soon afterward the exterior portion of the walls showed signs of giving away, whereupon sections were cut out and built in with brick. As time passed, the walls in the other portions also began to show the disintegrating effect of the fire on the concrete work.

We wish more particularly to direct the attention of the officers of the various fire departments to the danger which may attend concrete work, especially where the basement or foundation portion of the walls has been built of such material, and which in turn supports brick walls, three or more stories in height.

In many cases the concrete work is placed where the fire and steam together will tend to weaken the support, and in a moment, without warning, the walls may come tumbling down over the firemen, repeating the horrors frequently depicted by the press.

Making Paper Adhere to Metal.

A recently discovered method of making paper adhere to metal is so successful that after application it is next to impossible to remove the smallest portion of the paper without entirely destroying it, says the *Optician*. The invention is particularly adapted for the purpose of fitting metal plates at the back of lithographs, engravings, and designs of various kinds, additional value being given to it by the fact that atmospheric conditions cannot affect it.

Experiments have proved that all acids possess the properties necessary for this purpose, though varying in degree, but the best agent is hydrochloric acid mixed with an equal quantity of water to which has been added a little oxide of zinc, added immediately after the effervescing action has taken place. The plate of metal is coated with this compound, and after being dried carefully is covered with fine coach varnish. So prepared, the plate is placed in a drying oven with a temperature of about 30° C. for say 20 minutes—by this time the varnish will have almost entirely lost its adhesive power. Carefully place the sheet of paper intended for use on the prepared surface and

submit it to strong pressure. The result will be adhesion of the most perfect kind. The method may be applied with advantage to mounting colotype blocks by a pellicular process.

Drift Mining at Yankee Jims.

Yankee Jims was once famous for its rich mines. As is known to most of our pioneer residents, the district was mined principally on the surface, says the *Colfax Sentinel*. In some places it was fabulously rich and nearly everywhere the surface paid. Afterward, when mining was carried on extensively by the hydraulic process, several large mines were worked. Owing to the high banks and the extensive amount of clay and cement in the upper strata, many of these mines had to be abandoned, at least for a time. It was not because there was not gold there, but because there was so much non-paying material that had to be worked up with the pay dirt if the gravel was mined by the hydraulic process. A few years after being closed down came the warfare on hydraulic mining, and of course the abandonment became more effectual than ever.

Within the past years, although gravel has been found in so many of the mines in the vicinity, these old hydraulic mines have received but little attention. They have been looked upon generally as worked out because of the fact that the district is an old hydraulic district. A reporter of the *Sentinel* visited some of these old mines last week and was quite agreeably surprised at the prospect still in view. In one place is a line of old hydraulic pits up against the mountain side, abandoned because of the great height of the banks and the futility of working it by the hydraulic process. Here is a bank of gravel with a face of 3000 feet and extending back at least 3500 feet. Many of the claims have been lying comparatively idle for 20 years, owing to various causes. A few short tunnels have been run occasionally and some very rich gravel has been struck, but the tunnels have been too high and the water has prevented their being worked. As most of the mines have been held by parties abroad, they have received very little attention.

It is claimed by all the old pioneers about the place that the mines will pay to drift. To justify the necessary outlay for running a bedrock tunnel, putting up a mill, etc., the mines should be consolidated into one. There is every opportunity for gaining ample water power with the natural supply of water in the vicinity. The location is convenient, and the section all about there has paid well. The Mayflower mine is only about 1½ miles distant, and the Cranage and Federer mines are only a half-mile away. Last winter some very rich gravel was struck within a quarter of a mile of the mines mentioned.

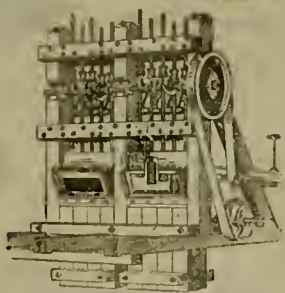
It strikes us that some day out of these old hydraulic mines will grow a good drift mine, just as has been done at so many places on the Forest Hill divide. If no reasonable prices are not asked, no doubt capital could be induced to prospect these old mines, and Yankee Jims become famous in the future for drift mining as it was in the past for surface mining.

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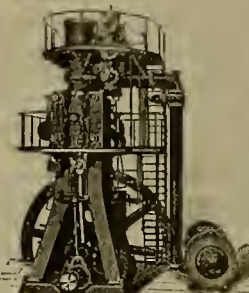
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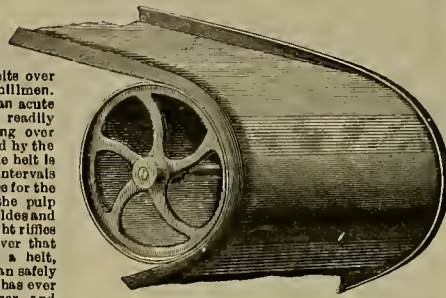


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Curious Facts.

Corsets have been found on the mummies of Egyptian princesses of the royal family.

Lobsters have a great dread of thunder, and when peals are very loud will swim to deeper water.

The owl's wise look is the result of a physiological oddity, his eyes being fixed immovably in their sockets.

Humboldt describes an oak tree which he saw in France, which was 90 feet in circumference at the base and was estimated to be 2000 years old.

The city of Glasgow, in Scotland, has a multitude of low-legged and knock-kneed children, made such by an almost exclusive diet of potatoes, they not getting bread, which contains the elements which stiffen and strengthen bones; and the same lack occasionally produces the painful specimens of rickety hunchbacks to be found in American tenements.

The lion is a formidable-looking beast, and his imposing appearance and great strength have caused him to be crowned the "king of beasts." But for all that, he is really inferior in muscular power to some other members of the same family. The strength of his fore limbs is said to be only 69 per cent of that of the tiger, and of the hind legs only 65 per cent.

The Congress of Norwegian Physicians, which recently met at Christiana, instead of hiring a hall, held its meetings on a large steamer which moved from place to place, so that they had fresh air and change of scene while they were holding their deliberations. Thus they were hygienic as well as scientific, and possibly less depleted in purse than if lodged in hotels.

The loftiest scientific station in Europe is Sonnblück's Observatory in the Austrian Alps. The keeper, Peter Lechner, has hitherto led a hermit life, but has recently found a peasant girl who will share his lofty and silent abode. The wedding took place at a village at the foot of the mountain, and among the wedding gifts were presents from the Emperor and from several native and foreign scientific societies.

A process of plating aluminum has been devised by Prof. Neesen, a German chemist, which shows very good results. The aluminum is first dipped in a solution of caustic potash or soda, or in murlatic acid, until bubbles of gas begin to appear, then into corrosive sublimate, then a second time into the caustic or acid, and finally into a solution of a salt of the desired metal. A film of the metal is rapidly formed, and adheres so firmly that, in the case of gold, silver or copper, the plate may be rolled out or polished.

Manufacture of Fulminate of Mercury.

An improved method of making this dangerous explosive is as follows: Ten grammes of mercury are dissolved in the cold in 120 grammes of nitric acid (sp. gr. 1.45). When the solution is complete and the liquid cold, this liquid is poured into a flask containing 110 grammes of alcohol (95 per cent strength). Action soon begins, without the application of heat, and is allowed to develop and then cease naturally. The mass is then treated with water until no longer acid, and when it has been slowly dried, it is ready for use.—Scientific American.

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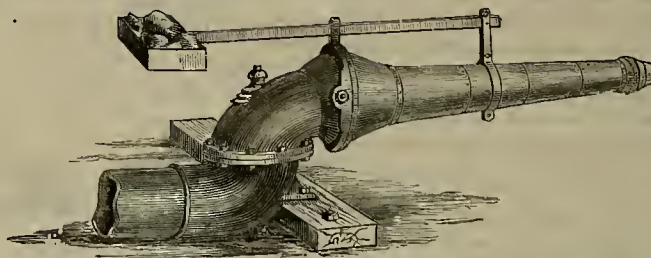
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Mining Summary.

The following is mostly condensed from journals published in the interior, in proximity to the mines mentioned.

CALIFORNIA.

Alameda.

A NEW INDUSTRY.—*Livermore Herald:* Messrs. Pitcher and Taylor last year paid out in other places for the crushing of their manganese and chrome and other ores nearly \$3000. They have decided that Livermore might just as well have the benefit of this and have concluded to erect a mill here. It is now in process of erection on the lot adjoining the electric works. A shaft will be connected with the engine in the electric works and the power obtained from it. About 60 tons of manganese are now dumped there ready to be crushed. The prospect of a large yield from the mines is good.

Butte.

PLACER MINING.—*Oroville Register:* Placer mining in Butte was at one time a very important industry, but this kind of mining gradually declined until now the shallow surface mines are but slightly worked. In place of these deep gravel mines have been found, and these give employment to many men and each year yield a good deal of gold.

The most famous of these mines is the Perschbaker, near Magalia. It is owned by N. D. Rideout of Marysville, and is without doubt one of the richest gravel mines in the world. Owing to its great depth and the immense quantity of water that has to be handled, it is a very expensive mine to work.

At Gravel Range several companies are working excellent channels beneath the lava rock. Near Nimsbaw and on Botte creek are very profitable gravel mines.

About Lovelock, Yankee Hill and Nimsbaw are numerous good mines.

At Enterprise gravel mining continues to pay well.

Bangor is at present the center of the most extensive gravel mines in the county. Here five or six large mines give employment to many men. The gold is found in a very hard blue cement which has to be blasted and then be ground on like rock ere it will yield its precious metal. Gravel mining is steadily increasing and the output of gold grows larger rather than smaller each year.

Calaveras.

AT THE BOLITHO.—*Angels Echo:* William Osborn is again at work driving the tunnel into the hill on the Bolitho mine. This is in some respects a very remarkable mine. The ore body into which the tunnel is being driven is 43 feet in width, at a depth of 100 feet. The ore contains about five per cent of rich sulphurets and increases in richness as the tunnel is driven ahead.

RICH STRIKE.—*Angels Echo:* A rich strike has recently been made in the Blair mine, near Smith's Flat. The rich discovery was made on the 200-foot level, where the vein is over 12 feet in width. The Blair mine is a splendid piece of mining property and gets richer as depth is attained. We understand that it is the intention of the owners to sink the shaft a hundred feet deeper. When this mine is thoroughly developed, it will be second to very few mines in this county as a gold producer. It is said that \$1600 were taken out of the Blair mine in a single day recently.

AT CAMPO SECO.—*Sentinel:* There is a strong effort being made in Lodi to form a mining company to operate near Campo Seco. It is a well-known fact that there are some good mines there, both quartz and placer, but by reason of the rebellious condition of the ore and the fineness of the gold in some places, it has been a difficult task to make it pay to operate there heretofore. Now, however, new patents and inventions have been brought into use, and ore that could not heretofore be worked to any advantage at all can now be profitably handled. Capitalists are turning their attention to these abandoned gold fields, and by reason of the low price of products many others are leaving the farming communities and prospecting in the mining districts. Campo Seco is near at hand and easy of access, and parties looking for investments in this way would do well to look over this section before going elsewhere. D. B. Nye, of Campo Seco, writing from there a few days ago, says he has mines that he would be willing to guarantee would pay from the start, if a small amount of capital could be secured to start with.

Kern.

THE GOLLA FIELDS.—*Kernville Cor. Visalia Delta:* In addition to the number of men who have lately come into the mines here, several parties have gone through for the Goller region. No very great portion of the gold there can ever be extracted until a canal shall be brought in from Owens river above the lake. This would cost all the way from \$200,000 to \$1,000,000, owing to the size of the canal. The "dead river" channel into these gulches is in some places filled with 1000 feet of silt.

El Dorado.

NO HARD TIMES.—*Democrat:* Thomas Stevenson informs us that mining matters are holding their own in his neighborhood, despite the cry of hard times, and that at the Johnson & Hadley mine, near Spanish Dry Diggings, they have been running ten stamps since last June profitably. They are now running a tunnel, and if the present indications are verified the owners intend to erect a new 20 stamp mill.

LOCATOR A MINE.—*Green Valley Cor. Republican:* George Leach & Co. of Colorado have located a quartz mine in our neighborhood. It is the north extension of the Meder mine. The

owners have sunk a shaft 70 feet deep and propose to continue to the depth of 200 feet to prospect the ore body. They have four men employed and have built a house on the ground. They are using a windlass to hoist with at present.

Aylmer, Patton & Co. are cleaning up their ground on Gray's Flat. It is a gravel deposit about 14 feet deep which they sluice off during the winter by rain-water caught in reservoirs. At present they are shoveling the bottom dirt into sluices and employ about six men. Their average daily clean-up is said to be 12 ounces.

Humboldt.

FROM MOREK HILL.—*Blue Lake Advocate:* Mr. W. G. Miller has received a letter from Mr. A. B. Campbell, one of the stockholders in the Morek Hill mine, announcing that operations have been resumed and telling of the progress made. The letter says in part:

I have burned nearly all the timber that was down when you left, also what slid in, and have cleared south and east of the mine about one and a half acres, burning everything cleared. I have burned nearly all the timber on the west that was down and intend to cut and burn all the timber to the prairie on the west and up the little creek on the west. I first set the giant about fifty feet in front of the point under where you last set it and about ten feet to the east, and piped from seventy to a hundred feet into the lower end of the mine, within about eight or ten feet of bedrock. Then we found so many had stamps wedged into the cut that I decided to take them out through the new cut.

We began on our last set of the giants at noon to-day. We developed the heaviest wash southeast of where our giant sets now that has ever appeared in the mine. So heavy was it that Stokes noticed it this morning as soon as he came into 'the mine. "That is the heaviest wash I have ever seen here," said he; "regular river holders." He tells me you found nothing like it last year.

We have a small cut now where the new opening will be and I don't think we are fifteen feet at the outside higher than the bedrock cut at the mouth and no sign of bedrock yet. * * * We manage to keep the pipe going all the time and haven't lost a day or an hour yet on account of the weather. * * * We tried a digger ranch fireplace but it smoked so we built a regular old-fashion fireplace.

A postscript dated later announces that the crew had "struck bedrock top just about as high as month of sluice and we piped three feet deep in it this eve."

Mariposa.

AT THE WAAN.—*Gazette:* Considerable machinery is being brought from San Francisco for the Ward mine. Barleigh drills are to be used, and there is talk of a 40-stamp mill being built immediately. This mine is one among the best in the county, and we will all be pleased to see it fully developed.

Orange.

ANOTHER COAL MINE.—*Santa Ana Blade:* L. M. Cox, R. C. Cotton and J. W. Pither have located a coal mine in the Hamilton canyon, an offshoot of the Trabuca. A paying vein of coal is already in sight, and the prospects are good for the development of a valuable property. A force of miners will be put to work at once to open the mine and get out coal. The coal is pronounced by experts to be of good quality. There is no doubt that the Santiago range has many good veins of coal, and it is only a question of time when it will be worked in quantity.

Nevada.

THE MAAFIELD.—*Transcript:* A small force of men were put to work on the Merrifield mine Monday. As soon as more men can be worked to advantage the force will be increased. The Merrifield is owned by the Champion Company, and they intend to open up and thoroughly prospect it, believing that there still exists in the lower depths valuable ore shoals that have never been touched.

MINING AT ROUGH AND READY.—*Tidings:* Henry Schroeder was up from Rough and Ready on Saturday and he reports that lively times are expected in the mining line at that camp this season. Men are at work cleaning out the shaft at the Osceola mine, which is under bond to Messrs. Moody and Gayety of Placer county, who have rehoned the mine to a company of San Francisco capitalists. These latter are expected here next week, when the erection of machinery on the mine will be commenced. The Mistletoe mine is still turning out good ore, as is also the mine belonging to the Dunstan Bros. of Grass Valley. The ore from these mines is not free-milling and has to be smelted, and it is said that a joint smelting works may be erected this summer near Rough and Ready to treat the ores from the different mines in that section.

THE MERRIFIELD.—*Transcript:* Charles E. Uren, county surveyor, to-day completed a full survey of the Merrifield mine property, which belongs to the Champion Mining Company. A large two-compartment shaft, 16 feet wide, will be sunk, commencing about 40 feet above the present shaft. New hoisting works will be put up and other necessary buildings erected, the lumber for which is already on the ground. Work will be pushed ahead as rapidly as possible, but it will be some time before many men can be put to work. As soon as the shaft is down deep enough to start a level, and the mine begins to be opened up, as large a force of miners as can be worked will be employed. The company means business and intends to open up the mine in a thorough and systematic manner.

AT THE CONLAN.—*Telegraph:* Mr. O'Connor, the superintendent of the Conlan mine, informs us that work on that property will be resumed immediately. The company intends to

see that excellent prospect to its utmost limit, and no means of development will be spared. It is on Osborn Hill and that is enough.

CLEAR OF WATER.—*Union,* April 6: The Granite Hill mine was entirely pumped out at 2 o'clock yesterday afternoon. The full force of men will be at work Monday and Superintendent Waggoner will push work as fast as possible.

TO BE STARTED.—*Union:* The Eastern Star mine on the Johnston ranch, southeast of town, owned by City Marshal Dennen and others, is to be started up this week.

A HYDRAULIC MINE.—*Union:* James Hackett of Rough and Ready has been granted a permit by the Debris Commission to work a couple of claims by the hydraulic process. The working of these claims will give employment to 20 men. As a small head of water will be used, it will require about two years to exhaust the gravel deposit. Other residents of Rough and Ready feel encouraged and will soon make application to hydraulic their claims.

BLOOMFIELD MINES.—The new quartz mines are making work and business for North Bloomfield, and in the event of their turning out well they will be a big help to the town, says the Nevada City Herald.

The Busy Bee claim keeps several men at work, and a contract is to be let for sinking a new shaft.

The White Diamond Company has put in a pump, and they now work two shifts in sinking their shaft.

The Bloomfield mine has put on a few more men lately, while the Derbec has reduced its force.

Placer.

STRUCK THE LONA.—*Sacramento Bee:* J. B. Patterson of Newcastle, formerly assemblyman for Placer county, was in the city lately. He says his mine near Newcastle is showing good results. They have tunneled in 300 feet and have struck the mother lode. The rock pans out now over \$20 per ton. Mr. Patterson says there is no stock for sale.

MUCH LUMBER.—*Colfax Sentinel:* The South Yuba Company has received 24 carloads of lumber for the flumes in this section. In all, the lumber amounts to over 200,000 feet, and is the largest shipment recorded here for a long time. The large pipe to be used in crossing Long ravine will be here in a short time. The company is making rapid headway, and the contractors are putting the "finishing touch" on their respective jobs. They are driving a tunnel near the Long ravine bridge, through which the pipe line will run for a short distance. The cuts for the pipe are all completed, and from now on the work will be very rapidly pushed.

Riverside.

THE GOOD HOPE.—*Riverside Press:* Col. Egan of the Good Hope mine, near Perris, says work is progressing at the mine very satisfactorily, and when the stamp mill is in place it will be one of the finest appointed mines in the whole country. It is expected to have everything ready for pushing the work of milling the ore by May 1st. The mine, when it came into the hands of the present owners, was down 350 feet. It is now down 550 feet, and proves better the deeper it goes. Col. Egan says that a number of the miners with families are building homes, and that the class of men he has brought with him is of that kind that make good citizens, many of whom having been engaged with him in mining matters for the past 18 years.

San Bernardino.

GOON MINES.—The Tingman and Holland mines, located about 20 miles north of Indio, are still yielding gold in paying quantities, and give promise of greater development. Tingman's mill has been crushing ore for Lang & Son, but as soon as he can arrange for water, Mr. Lang will put up a mill.

A MILL FOR CRASOENT.—*Vanderbilt Shaft:* A. F. Stevens arrived in Vanderbilt on Monday, being on his way home from San Francisco, where he went to purchase a stamp-mill for the Legal Tender Mining Company, of which he is superintendent. The mill, which will be here by April 15th, is a Fulton Iron Works five-stamp mill, the stamps weighing about 900 pounds each, and will drop five stamps 100 times per minute. Although but five stamps will be put in at first, there will be power for 10 stamps, and the mill will be fitted for that number. Frue Vanner concentrators will be used. The mill is to be erected at Crossmen Springs, 3½ miles from the mines. The haul from the mines to the mill will be all the way down hill, however. The mill building will be 25x75 feet, and will be built of Arizona lumber. Besides this, there will be erected an engine room 20x30 feet, an office 12x24 feet, an assay room 12x14 feet, and a dwelling house for Mr. Stevens. The head carpenter will be Mr. Stevens' brother, E. C. Stevens, who came down from San Francisco to take the position.

CONSIDERABLE WATER.—*Shaft:* The Bronze is producing considerable water at present; in fact, the amount produced is increasing daily, and by the time that the shaft has been sunk another 100 feet the company will have little need of the water from Willow Springs, with which the stamp mill is now supplied.

The mill is working to perfection. All the kinds of ore thus far tried have been satisfactorily worked, and there is no doubt that the mill will accomplish all that was claimed for it.

THE BOOMEZANG.—Mr. Campbell is now erecting a steam hoist at this mine. He has been intending to do this for some time, but was hindered because all his mechanics were on the mill. The hoist will be in operation very soon, and it is probable that the shaft will be sunk to the 500 foot level at the rate of a foot per shift, the shifts being eight hours. The vein is looking splendid at the bottom of the shaft, being as strong and as well defined as ever, although

it is below the point at which, it has always been claimed, the vein would quit. The vein has never looked more promising than at present.

As soon as the hoisting works are completed, the construction force will immediately begin the erection of the mill building. Mr. Campbell, being in a hurry to get the stamps working, simply put the machinery in place, erecting no building at the time. Now, however, it will be put up, and will be a very large and complete structure.

San Benito.

PROSPECTING.—*Advance:* Sam E. Moore and David Labiff, Sr., are down from the Chalome mines this week for a short vacation. For the past eight months they have been engaged in running a prospect tunnel for Flint, Birby & Co. The mine is situated about nine miles distant from San Benito and about a mile and a half southeast of the Pinacles. The tunnel has reached a length of 415 feet, the dimensions being 4x6. The tunnel runs through what appears to be a mixture of lime rock and quartz. Continual drilling is necessary and the debris is conveyed to the mouth of the tunnel in wheelbarrows. Crosscutting will begin shortly. The indications for finding pay quartz are very good, and the boys expect to uncover a bonanza before long.

Shasta.

LEASED A MINE.—*Courier:* Jim Salles and Wm. Obvnewel have leased the Spanish mine on the old Wiser place and have been working on the property, with the expectation of developing a bonanza.

Siskiyou.

RICH LAROS.—*Yreka Journal:* The Lewis Bros. and Esslick are meeting with great success in developing their quartz mine in Oro Fino district, Scott valley, about a mile from the town of Oro Fino. They found a prospect of \$10 to the pan on the surface, and find equally good prospects over 30 feet below the surface in their prospecting shaft, with gold plainly visible to the naked eye all through the ledge. The ledge, on account of its richness, was at first supposed to be only a pocket, but the more it is developed the more certain it appears to be a permanent mother lode, varying in width from 33 inches up to 7 feet. The owners feel confident that they have the best quartz mine in Siskiyou county, or on the coast—in fact a bonanza likely to prove a great fortune to them.

Wright & Co., at Oro Fino, have their large ditch full to overflowing with water, and are now busily engaged in operating their giants, to take out a great quantity of dust this year of great value, as Oro Fino dust is considered the richest in the county, as the Spanish name of the place indicates, and so called for that reason when first discovered over 40 years ago.

Manuel Brazil, who owns a placer mining claim at Hawkinsville, took out a nugget last Wednesday which paid \$125. Other claims in the vicinity are also reported as paying well, with a good supply of water from the gulches to permit success in washing pay gravel for a long time this season.

Siskiyou.

CINNABAR SPECIMENS.—A Klamath river correspondent of the Yreka Journal says he has shown some specimens of cinabar from a quicksilver mine owned and operated by P. C. Lange, about four miles below Oak Bar, on the Klamath. The specimens were very fine, nearly 60 per cent of the gross weight being quicksilver. In this mine is also found a character of crystallized mercury which is very rare, and for which Chinese merchants in San Francisco pay from \$2 to \$12 per pound.

Trinity.

A CLEAN-UP.—*Journal,* April 7: A partial clean-up was made last week in the Mammoth mine at Red Hill, the property of Lorenz & Leibbrandt. From the first five boxes of the flume \$7000 was realized. The owners are confident of making a larger clean-up than usual this season.

NEVADA.

Washoe District.

OPERATIONS IN COMSTOCK MINES.—The following additional official news of last week's operations in Comstock mines has been received at the local offices of the companies:

In the Consolidated California and Virginia mine, on the 1650 level, the drift running north from the end of the crosscut ran east from the drift run north from the east crosscut No. 1 from the north drift from the winze—down 52 feet—has been extended during the week 27 feet; total length, 96 feet; continuing in porphyry, clay and quartz of low assay value. Have done some prospecting work in the vicinity of the winze down 20 feet, but no ore has been extracted. 1000 level—The Rule drift—The drift running north, 50 feet above the sill floor, from the upraise which was carried up at a point 353 feet south from the shaft station, has been extended 25 feet; total length, 50 feet; continuing in a clay and porphyry formation. A south drift from the upraise, 50 feet up, has been advanced 15 feet in a porphyry formation. West crosscut No. 4, 527 feet south from the shaft station, has been extended 33 feet; total length, 48 feet, in porphyry with streaks of quartz of only nominal value. From this west crosscut, at a point 15 feet in from its mouth, a north drift has been advanced 20 feet, showing porphyry with streaks of quartz of very low assay value.

In the Ophir mine the north drift near the end of the old Central tunnel, which will soon connect with the old Mexican shaft, was reopened and repaired during the week 54 feet; total length, 196 feet. On the 1465 level the crosscut running west from the drift run north from the crosscut run west from the main north drift on the sill floor of this level, at a point 124

feet south from the winz station, has been extended during the week 10 feet; total length, 70 feet, and stopped in very hard rock. From the crosscut running from the main north drift, at a point 219 feet in from its mouth, a north drift has been advanced six feet in porphyry, showing lines of quartz. Have continued (jointly with the Mexican Company) the work of making repairs to the incline shaft which descends downward from the 1465-level station of the main shaft. In the Mexican mine on the 1465 level the upraise near the mouth of the crosscut run west from the drift run south from the top of the upraise which was carried up 45 feet above the sill floor of this level at a point 40 feet west from the main north drift, and 100 feet north from the south line of this mine, has been carried up during the week seven feet; total height, 58 feet, continuing in a very hard porphyry formation. In the Andes mine, on the 420 level, west crosscut No. 3 was extended 15 feet; total length, 139 feet; face in porphyry.

In the Hale & Norcross mine, on the 900-foot level, they advanced the south drift 13 feet; total length, 170 feet; face in porphyry. 1100 level—Advanced the south drift 12 feet; length, 167 feet; face in porphyry.

Devil's Gate District.

PROSPEROUS MINES.—Territorial *Enterprise*, April 4: "Silver City will send no contingent to join the Industrial Army on its march to Washington," said a resident of that prosperous mining town yesterday. There are no idle men in Devil's Gate district; though all are not making wages, those who are not have a fair prospect of doing so, as they are always at work endeavoring to develop ore streaks that will pay.

Taylor's mill is now running on ore from the Oest mine, and the cleanup will leave a margin of \$15,000 or more in gold bullion.

The Southend location is showing a two foot vein of gold-bearing quartz averaging \$50 per ton, and the vein is widening as depth is attained. This location is owned by F. A. Bierke and is worked on royalty by Harry Brown.

At the Silver King, William Naleigh is finding some fair-grade ore, after several months spent in prospecting.

At the Haywood, Colonel Quinn is taking out considerable pay ore, and several other locations in the district are paying fairly well.

Flowery District.

SIX-MILE CANYON NOTES.—*Virginia Enterprise*, April 6: The mild temperature of the past few days has released the motive power of the mills along Six-mile Canyon creek, and the ore accumulated during the winter months will soon be pulverized. Prospectors have been working in Flowery district through the winter without making any important ore discoveries; but, as they are continually delving in ground that has heretofore produced a large amount of bullion, the prospect of making important ore strikes is favorable. In 1870 a pocket was found in the Golden Prize location in that district from which \$60,000 in gold is said to have been extracted from a space not exceeding six square feet, and it is probable that many more deposits of that kind will eventually be developed.

Benjamin Pfeiffer, the owner of the Lady Bryan, is preparing to develop the surface workings of that property this summer, and, as he has his own mill and team, he will be able to operate the property on a self-sustaining basis.

The veteran prospector and "bard of Six-mile canyon," Andrew Jackson Sheppard, has made several strikes of pay ore in the past ten years, and is hopeful of making a good cleanup in the next two months.

Several owners of blanket claims along the course of Six-mile Canyon creek will turn their attention to placer mining, as the returns from sulphuret concentrations obtained from ore tailings barely pay expenses. Coarse gold has frequently been found in the bed of Six-mile Canyon creek, but not in sufficient quantities to make it remunerative.

The surface workings of locations in Flowery district all show a preponderance of gold in the quartz veins; and, as the low price of silver has made mining for that metal unprofitable, prospectors are devoting their time exclusively to a search for the yellow metal, and Flowery district offers better inducements to gold-seekers than any other locality in this county.

The owners of the Brophy mine in Flowery district, which is patented ground, are wealthy San Franciscans, and they propose to resume the development of that property at an early date. Several gold-bearing quartz ledges have been uncovered in the Brophy, the ore from which could be profitably worked if the company erects a water-power mill on the creek and operates the mine economically.

ARIZONA.

GOOD PROSPECT.—*Globe Silver Belt*: E. J. Edwards and his son, Aaron, returned on Tuesday from a trip to the old mine near Salt river, discovered some months ago, and which is being exploited by Globe parties, C. B. Edwards among the number. Rock carrying gold was discovered, which has since developed into a very good prospect. Mr. Edwards was very favorably impressed with the mine.

A Mexican is reported to have found two gold nuggets in Gold gulch recently, one valued at \$10 and the other \$8.50. There is considerable prospecting for gold going on in that locality.

PROSPECTORS BUSY.—*Phoenix Review*: Speaking of prospecting the other day a well known mining man said: "There are at present within a radius of a hundred miles from this city three times as many prospectors as ever before. Ample spring rains and bountiful snows in the mountains have made it unusually favorable for those searching for gold mines to prosecute their work, and the sturdy miners are taking advantage of the opportunity. The activity so

far has been attended with good results, but many parties have not yet reported. Many claims, however, are being recorded, and confidential friends are daily button-holed and carried to a convenient place to be shown rich specimens."

BRITISH COLUMBIA.

LEDGES OF GOLD ORE FOUND.—A Victoria dispatch, March 31, says: A gold quartz ledge 24 feet wide and assaying \$10 to the ton has been found at Pitt lake, 25 miles from this city. It is considered a peculiarly valuable find on account of its proximity to the transcontinental lines and the large quantity of ore in sight.

The rich strike is said to have been made at China creek, Alberne, by Edward Wilkins. The vein is over 700 feet wide, and there are thousands of tons of rich ore in sight.

OREGON.

A SPARTA MINING PROPERTY.—Baker City *Democrat*: Mr. George Shindler was in the city recently purchasing supplies to be shipped to the Cove mine, in Sparta district, on what is known as Murray gulch, and only about one mile from the Ollie Woodman mine, which has recently come into considerable prominence. The Cove is owned by Messrs. Geo. Shindler, O. S. Buckland and Charles Slade. It was located last year by Messrs. Buckland and Slade, and a few weeks since a third interest was disposed of to Mr. Shindler, who immediately went to work to develop the property. At this time a shaft 50 feet in depth has been sunk, the ledge at this depth being 1½ feet wide, the ore prospecting very rich in gold. The owners are very sanguine of their prospects and will continue development.

SETTLED ITS DEBTS.—*Jacksonville Times*: The Myrtle Creek Mining Co. has settled its debts by paying about 85 cents on the dollar and all costs, and will continue operations on a large scale.

J. A. Martin, of Footh Creek, called on us Friday, from whom we learned that Messrs. Goldworthy, Bailey and other miners in that district have again bonded their placer mines.

The dam at the Simmons-Cameron mine, near Waldo, which went out in January, was soon afterward replaced, and operations are progressing there with a full head of water and good prospects. A late season is expected, on account of the deep snow in the mountains. Swinden & Hayes, who are mining in Josephine county, near the Redlands nursery, feel greatly encouraged, as they have picked up several nice nuggets lately, one of which weighed \$136 and another \$85.

J. Smith and John Miller, who have been prospecting in Gold Hill district, have struck a rich pocket of quartz, from which they have abstracted considerable gold.

WASHINGTON.

THE WENATCHEE PLACERS.—*Cor. Spokane Review*: W. E. Schute came down from his placer claims Saturday, bringing evidence in support of his assertion that a mining excitement is already on in the district. Mr. Schute located his claims two years ago. They lie just below the mouth of the Peshastin on the Wenatchee river. He has found during the past week a clearly defined pay streak, which is rich enough to pay good wages with a pan. He brought with him the product of one pan of the dirt, which weighs 65 cents in coarse gold. Charles Burch, a practical mining man, says there is as much more fine gold in the cleanings that Mr. Schute had not the facilities to save. He panned out \$2 in less than two hours with a rocker. This pay streak is about 18 inches wide and from 18 inches to five feet deep. This discovery explodes the generally accepted belief that placer mining on the Columbia river and its tributaries must be confined to surface operations. Charles Burch, one of the early settlers, says the ground located by Messrs. Schute and Moody has been worked off and on for 20 years, always with more or less success, and the opinion has always prevailed that a rich pay streak existed; but not until now has it even been found. The quartz miners from Peshastin, years ago, depended upon this field for a "groh stake" when returning from fruitless prospecting tours. Fred Patterson has a claim adjoining that of Messrs. Schute and Moody, out of which he took \$270 in a few days' work last fall.

The wagon-road around Rocky Point is nearly completed. This will remove a dangerous obstacle and promote travel to and from Wenatchee and points in the Big Bend and Okanogen country.

The steamer Ellensburgh will make her first trip down the river on April 1st. Captain Hansen will be in charge this season.

Prospectors and miners are daily outfitting for their summer mining operations.

—The following figures give a condensed statement of the operation of the proprietary and leased lines of the Southern Pacific Company for the years 1892 and 1893, ending December 31st of both years:

	1893.	1892.
Gross transportation earnings.....	\$48,049,643 32	\$48,972,195 20
Freightage, rentals and other receipts....	653,609 68	993,705 05
Total receipts.....	\$48,703,253 00	\$49,965,900 25
Operating expenses.....	\$30,576,244 06	\$31,288,199 27
Betterments.....	1,201,833 95	2,301,737 26
Fixed charges and taxes.....	16,135,723 47	15,767,351 89
Total expenses.....	\$47,913,801 48	\$49,357,288 42
Balance.....	\$ 794,366 62	\$ 308,611 84
Income from investments of S. P. Co.....	311,459 63	211,932 66
Balance—Expense in reconstruction of road and additions..	1,106,796 65	620,644 49

Coast Industrial Notes.

—The terra cotta works and Starr mills of Vallejo will soon resume operations.

—It is reported that application has been made for a franchise to build and operate an electric line between Nevada City and Grass Valley. The promoters of the enterprise are Virginia, Nev., capitalists.

—It is learned at San Diego that the National City & Olay Railroad Company has obtained a right of way for the extension of its line from Tia Juana across the Mexican line and up the Tia Juana valley to Hot Springs, a distance of about six miles. The purpose of the extension is to establish the headquarters of the Mexican Land and Colonization Company at Hot Springs instead of at Ensenada, in order to be more accessible to San Diego.

—The Southern Pacific Company will move its headquarters from the corner of Fourth and Townsend streets to the new building of the Union Trust Company, corner of Market and Montgomery streets, on the 1st of next November. Arrangements for carrying out this object were completed last week and a lease for ten years, subject to renewal on favorable terms, was signed by H. E. Huntington, representing the Southern Pacific, and I. W. Hellman, who acted for the Union Trust Company. The provisions of the lease have not been made public, but it is known that the annual rental is \$20,000. The building consists of seven floors. The first will be devoted to the business of the Trust Company and the six above that point will be occupied by the railroad company's offices.

—Further complications have arisen between the Bear Valley Company and the people of the Moreno and Alessandro Company. The Board of Directors of the Alessandro Irrigation district has rescinded the action taken a fortnight ago by which they proposed to pay interest on the irrigation bonds which the Bear Valley people held, provided the latter would pay into the treasury of the irrigation district some \$25,000 due as taxes. Foster, who represents the English stockholders, yesterday made a formal demand on the treasurer of the district for \$16,000 due on coupons of the district's bonds. The demand was refused. The people of the district say that they should not be compelled to pay interest on their \$750,000 of bonds until Bear Valley places water on their lands according to contract, the bonds having been assigned to that company on condition that it provide the water.

—The latest census bulletin gives the following figures for the year of 1890: True value of real and personal property in California, \$2,533,000,000; Washington, \$760,000,000; Oregon, \$590,000,000; Nevada, \$180,000,000; Arizona, \$188,000,000; New Mexico, \$231,000,000; Utah, \$349,000,000. New York leads with \$8,560,000,000. Wyoming is the poorest of the States, with \$169,000,000. The per capita of valuation for the entire country has increased from \$308 in 1850 to \$1039 in 1890. The per capita in California has increased from \$239 in 1850 to \$2097 in 1890. California had in 1890 52,894 farms, including lands both improved and unimproved, over 21,000,000 acres. California stood sixteenth in the number of horses owned, as well as in mules and asses. She stood twenty-sixth in the number of work oxen, seventeenth in milch cows, seventh in other cattle, twenty-second in swine, third in the number of sheep, including spring lambs, and second in pounds of wool produced in 1890. Ohio headed the list with nearly 21,000,000 pounds, California shearing over 16,000,000. California headed the list of barley producers with 17,500,000 bushels. She was second in wheat, with 40,000,000 bushels, Minnesota leading with 52,000,000. California was third in hops, with 6,500,000 pounds, Washington producing 8,000,000 and New York 20,000,000. California was second in bean raising, having 700,000 bushels, against New York with 1,100,000.

—A bulletin issued by the Census Bureau gives the statistics of the various manufactures in the several States, including sixty-seven different lines: California is shown to stand as to the value of products in the different branches as follows: Agricultural implements, ninth; blacksmithing and wheelwrighting, seventh; boots and shoes, tenth; bread and other bakery products, eighth; brick and tiles, eleventh; carpentering, thirteenth; carriages and wagons, fourteenth; cars and general shop construction and repairs by steam railroad companies, eighth; dairy products of factories, nineteenth; chemicals, tenth; men's clothing, custom and repairing, sixth; same, factory product, tenth; woman's clothing and dressmaking, sixth; woman's clothing, factory product, sixth; coffee and spice roasting and grinding, sev-

enth; confectionery, ninth; cooperage, eleventh; fertilizers, sixteenth; flouring and grist mill products, eleventh; foundry and machine shop products, twelfth; furniture, twelfth; illuminating and heating gas, fourth; hats and caps, other than wool, ninth; iron and steel work, seventeenth; architectural iron work, tenth; jewelry, seventh; leather, tanned and curried, sixth; distilled liquors, fourteenth; malt liquors, eleventh; lumber mill products, fourth; planing mill products, tenth; marble and stone work, eleventh; masonry, brick and stone work, eighth; millinery, eighth; painting and paper-hanging, tenth; paints, ninth; paper, fifteenth; patent medicines, thirteenth; paving and paving materials, fifth; plumbing and gas-fitting, twelfth; book and job printing and publishing, eighth; newspaper and periodical printing and publishing, seventh; saddlery and harness, eleventh; shipbuilding, fourth; shirts, fifth; silk, seventh; wholesale meat slaughtering and packing, seventeenth; soap and candles, eighth; sugar and molasses refining, second; chewing and smoking tobacco, fifteenth; cigars and cigarettes, ninth; woolen goods, fourteenth.

Sampling Works for Sale.

The works are situated at Daggett, Cal., in the Calico Mining District, and on side track of the Atlantic & Pacific Railroad. They contain a first-class 60-horsepower engine and 45-horsepower boiler, with ore-crusher and other machinery. Mill Scales, Assaying Outfit, etc., all nearly new. Also upon the premises an office building and a comfortable dwelling-house (portable). The above can be had at a bargain. Apply to JOHN H. GILLESPIE, 1914 Stockton St., San Francisco.

20-Stamp Mill for Sale.

In Southern California, a 20-stamp Gold Quartz Mill, with engine, boiler, self-feeders, rock-breaker, etc. As the premises are adjacent to Railroad, the Mill could be conveniently removed. Can be had at low price for cash. Address: "Quartz Mill," care Mining and Scientific Press, San Francisco.

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Market Reports.

The Markets.

SAN FRANCISCO, April 12, 1894.

After appearing to have recovered its legs last week, silver weakened and receded. It is now, however, in somewhat better condition than it had recently been.

The London Statist, in sketching the history of the silver market since 1888, concludes that the recent fall in the price of silver was due to panic, and that its recovery is inevitable if the Indian mints are reopened, perhaps to 36. But the Statist adds that the extent of this depends on whether India will resume buying on the usual scale.

New York Prices.

NEW YORK, April 12.—Following are the closing prices for the week:

	Silver in	Copper.	Lead.	Tin.
Thursday.....	28 1/2	61 1/2	9 50	3 20 19 25
Friday.....	28 1/2	61 1/2	9 50	3 20 19 25
Saturday.....	28 1/2	61 1/2	9 50	3 20 19 25
Sunday.....	28 1/2	61 1/2	9 50	3 20 19 25
Monday.....	28 1/2	61 1/2	9 50	3 20 19 25
Tuesday.....	28 1/2	61 1/2	9 50	3 20 19 25
Wednesday.....	28 1/2	61 1/2	9 50	3 20 19 25

San Francisco Metal and Coal Market.

	ANTIMONY.	QUICKSILVER.
Per lb.....	@ 13	Home trade, pr. 30 00 @ —
BORAX.....	@ 21	STEEL.....
Refined, in ear lot.....	@ 21	English, D.....
Powdered, do.....	@ 21	Canton tool.....
Concentrated, do.....	@ 21	Alk Diam'd tool.....
All grades jobbing at advance.....	@ 21	Pick & Hammer.....
COPPER.....	@ 21	Malinery.....
Bols.....	@ 23	Toe Calk.....
Sheathing.....	@ 23	PIG TIN.....
Ingot, jobbing.....	@ 20	Spot @ lb.....
Do, wholesale.....	@ 15	Spot @ lb.....
IRON.....	@ 16	Spot @ lb.....
Bar, base.....	@ 41	Spot @ lb.....
Norway, base.....	@ 41	Spot @ lb.....
Pin IRON.....	@ 41	Spot @ lb.....
Ellipton & ton.....	@ 22	Spot @ lb.....
Glenbrook.....	@ 22	Spot @ lb.....
Am. Soft, No. 1.....	@ 22	Spot @ lb.....
Shot No. 1.....	@ 22	Spot @ lb.....
Puget Sound.....	@ 22	Spot @ lb.....
Clay Lane White.....	@ 22	Spot @ lb.....
Langdon.....	@ 22	Spot @ lb.....
Gartbarrie.....	@ 22	Spot @ lb.....
Barrow.....	@ 22	Spot @ lb.....
Cargoeft.....	@ 22	Spot @ lb.....
LEAD.....	@ 41	Spot @ lb.....
Pipe.....	@ 41	Spot @ lb.....
Drip, sizes smaller than.....	@ 41	Spot @ lb.....
Do, 1/2 bag of 25 lbs.....	@ 41	Spot @ lb.....
Do, 1/2 bag of 25 lbs.....	@ 41	Spot @ lb.....
Buck, Balls and Chilled.....	@ 41	Spot @ lb.....
Do, 1/2 bag of 25 lbs.....	@ 41	Spot @ lb.....

Mining Share Market.

SAN FRANCISCO, April 12, 1894.

The Comstock market during the week has had in the main a strong tone. It has been the most active and profitable week the brokers in Comstock shares have had for a month past. There were lively fluctuations in the leading stocks, and a large trade was done in the smaller-priced ones.

The interest among brokers and dealers centered chiefly in Ophir, but Potosi to the middle group had strong backing, and some of the Gold Hill shares were in good demand. Ophir stock was evidently under the control of inside operators, for brokers who are known to represent them had a great deal to do with its ups and downs. At the opening yesterday Ophir rose to \$3.20-3.25, and afterward had a further advance to \$3.40, which is the highest price the stock has reached since last December, in which month Con. California sold at \$5, and the whole line of Comstock shares was booming over the so-called Rule project, which resulted so unsatisfactorily. Later in the forenoon Mr. M. Ser supplied the market with Ophir, and the price went back to \$3.05, but it was evident at all times that some skillful manipulation was in progress.

Board Sales of Mining Stocks.

S. F. Stock Board.

THURSDAY, April 12, 1894.

9:30 A. M. SESSION.

100 Andes.....	54c	100 Kootenai.....	9c
500 Belcher.....	72c	200 L. Wash.....	5c
400 Bodie.....	50c	400 Mexican.....	1.65
200 B. & E.....	1.65	300 Ophir.....	3.40
100 C. & Va.....	3.15	100 Overman.....	3.45
100 Bodie.....	3.10	300 Potosi.....	1.10
100.....	3.05	400 Sierra Nev.....	1.15
100 Crown Point.....	55c	300.....	1.20
100.....	55c	300 Seg. El.....	1.30
400 G. & C.....	72c	200 Union.....	90c
500.....	72c	200 Union.....	90c
200 Grand Prize.....	55c	150.....	85c
400 H. & N.....	55c	200 Yellow Jacket.....	62c
100.....	55c	200.....	62c

2:30 P. M. SESSION.

50 Alta.....	18c	600 Crown Point.....	55c
50 Andes.....	55c	700 Exchange.....	5c
100.....	55c	100 G. & C.....	80c
500 Belcher.....	72c	100 H. & N.....	55c
200 Best & Belcher.....	1.65	50 Justice.....	1.1c
100.....	1.60	450 Mexican.....	1.65
500 Bodie.....	3.10	300 Mono.....	1.7c
550 Bullion.....	3.10	300.....	1.8c
100 Bulwer.....	11c	300 Ophir.....	3.40
100.....	11c	400 Overman.....	1.3c
300 Challenge.....	47c	300 Potosi.....	1.15
100.....	40c	200 Savage.....	70c
400 Cal. & Va.....	15c	1000 Scorpion.....	8c
50 Chollar.....	35c	50 Sierra Nevada.....	1.20
100.....	35c	15.....	1.25
150.....	37c	100 Union.....	90c
400.....	35c	250 Yellow Jacket.....	61c
850 Con. Cal. & Va.....	3.20	350.....	62c

Complimentary Samples.

Persons receiving this paper marked, are requested to examine its contents, terms of subscription, and give it their own patronage, and, as far as practicable, aid in circulating the journal and making its value more widely known to others, and extending its influence in the cause it faithfully serves. Subscription rate, \$3 a year. Extra copies mailed for 10 cents, if ordered soon enough. If already a subscriber please show the paper to others.

Patents Issued to Pacific Coast Inventors.

Reported by Dewey & Co., Pioneer Patent Solicitors for Pacific Coast, 220 Market Street.

FOR WEEK ENDING APRIL 3, 1894.

517,738—SCHOOL DESK.—T. Beal, Los Angeles, Cal.	517,739—NUT LOCK.—J. H. Burrows, Globy, A. T.
517,741—CAR BRAKE.—U. B. Cary, Los Angeles, Cal.	517,793—VENTILATOR.—W. T. Collier, Los Angeles, Cal.
517,794—FRICTION CAR.—W. T. Collier, Los Angeles, Cal.	517,816—ROCK DRILL.—L. N. Day, San Jose, Cal.
517,867—FIRE GRATE.—F. L. & Wheeler, Tacoma, Wash.	517,893—ORAIN METER.—S. M. Finch, Marysville, Cal.
517,843—ACC. RIGON.—J. O. Galizzi, S. F.	517,845—CONTAIN. FIXTURE.—C. E. Oordrich, Placoe, Nev.
517,849—ELECTRIC RAILWAY.—W. C. Keibly, S. F.	517,820—DRY-CRATING CASE JUICE.—J. K. ehl, S. F.
517,830—MUTUAL CANS.—A. W. Livingston, S. F.	517,704—FLANOKER.—T. W. Macfarlane, Ellensburg, Wash.
517,018—ON-CAN DISCHARGE.—W. Mathews, Alameda, Cal.	

517,323—SKATING RINK.—Mead & Clemens, S. F.	517,529—PUMP.—G. W. Price, S. F.
517,767—AMALGAMATOR.—N. L. Raker, Corvallis, Or.	517,808—MONOLITHIC PIPES.—E. L. Rame, Oakland, Cal.
517,827—FRANER.—Roberts & Furrourge, Santa Cruz, Cal.	517,832—AIR COMPRESSOR.—Schutz & Henderson, Sierra City, Cal.
517,700—STREET SWEEPER.—J. B. Tilt, Fresno, Cal.	517,784—PENCIL SHARPENER.—A. Werner, Placoe, Nev.
517,633—DESK.—M. A. Wertheimer, S. F.	517,736—FRUIT CUTLIER.—J. K. Woodward, Riverside, Cal.
517,637—KILN.—P. L. Youngren, Oakland, Cal.	

NOTES.—Copies of U. S. and Foreign patents furnished by Dewey & Co. in the shortest time possible by mail or telegraphic order. American and Foreign patents obtained, and general patent business for Pacific Coast Inventors transacted with perfect security, at reasonable rates, and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

HYDRAULIC AIR COMPRESSOR.—Emile Schultz and John H. Henderson, Sierra City, Cal. No. 517,628. Dated April 3, 1894. This invention relates to an apparatus for injecting and compressing a body of air by the application of a column of water under pressure. The object is to inject into compressing cylinders, by means of jets of water under pressure, a body of air larger than can be supplied by simple displacement, and at the same time to cool this body of air by contact with the water and to compress and deliver it into transmitting pipes and receivers. The mechanism by which this is effected consists of vertical cylinders having inlet pipes with oppositely moving controlling valves near the opposite ends of the cylinders, and mechanism for operating the valves, so that water is alternately admitted under pressure into the cylinders and discharged therefrom, and a jet nozzle and air inlet valves through which the air is drawn and injected with the water into the cylinders, and certain other details of construction which cannot well be explained without engravings.

A DISCHARGE ATTACHMENT FOR OIL CANS.—William Mathews, Alameda, Cal. No. 517,618. Dated April 3, 1894. This invention relates to a device whereby the contents of liquid containing cans may be drawn therefrom and leakage and dripping from the discharge nozzle avoided. It consists of a chamber having a hole in the top and a can having an extension in its top, with a spring-actuated closing valve opening inwardly. This can being inverted so as to stand upon the chamber, first referred to, the valve will be opened to allow the liquid to flow into the lower chamber, in which it rises to the edge of the can extension which projects into the chamber and is there arrested, because no more water can enter. The draw-off pipe consists of a tube connected with the bottom of this chamber, this bottom being flexible so as to allow the pipe to be depressed or raised. When this pipe is in its normal position it is held up by a spring, and the discharge end, making a reverse curve, is above the level of the liquid in the chamber. When it is depressed, the liquid will flow out as long as it remains in this depressed position, but when the tube is released it will rise to its normal position and stop the flow.

CONTINUOUS KILN.—Peter L. Youngren, Oakland, Cal. No. 517,637. Dated April 3, 1894. The objects of this kiln are, first, to provide means for water-smoking all parts of the kiln equally; second, to provide for regulating the degrees of heat and velocity of circulation in the water-smoking section of the kiln; third, to obtain a more uniform degree of heat in the burning section; fourth, to provide means for controlling the passage of air through and above the burnt brick; and fifth, to provide that certain parts of the operation shall be automatic. These several objects are attained by means of the peculiar construction and arrangement of the parts of the kiln, the principal features of which are a rib or barrier in the crown of the kiln, provided with suitable damper-controlled openings, said openings being, preferably, automatically controlled by means of supporting the dampers upon the settling ware and transverse flues extending under the compartment floors and connected with a supplementary furnace.

ROTATING GRAIN METER.—John M. Finch, Marysville, Cal., assignor of one-half to Frank Miller of the same place. No. 517,608. Dated April 3, 1894. This meter is an improvement in that class of weighing apparatus in which a rotary wheel, having upon its periphery suitable receptacles for the material to be weighed, has connected with it a check or balance adapted to retard its movement sufficiently and pro-

MINING SHAREHOLDERS' DIRECTORY.

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ASSESSMENTS.

COMPANY AND LOCATION.	NO.	AMT.	LEVIED, DELINQ. AND SALE.	SECRETARY.
Andes S M Co, Nevada.....	49.....	25c.....	Mar 6, April 10, April 23.....	John W T Wiggins, Nevada Block
Belcher S M Co, Nevada.....	48.....	25c.....	Mar 12, April 17, May 8.....	L Perkins, Mills Bldg
Bodie Cons M Co, California.....	17.....	15c.....	Mar 10, April 16, May 14.....	M E Willis, 414 California
Caladonia C M Co, South Dakota.....	18.....	50c.....	Mar 8, April 10, May 10.....	F G Damm, Mills Bldg
Challenge Cons M Co, Nev.....	19.....	5c.....	April 3, May 8, May 20.....	C L McCoy, Mills Bldg
Chollar M Co, Nevada.....	35.....	50c.....	Mar 21, Apr 21, May 15.....	Chas E Elliot, New Block
C & V M Co, Nevada.....	1.....	5c.....	Mar 6, April 10, April 28.....	A W Havens, Nevada Block
East Sierra Nevada M Co, Nevada.....	3.....	5c.....	Jan 10, April 20, May 11.....	Geo R Updegraff, 310 Pine
Evening Star M Co, Cal.....	11.....	10c.....	March 27, May 3, May 21.....	J J Scoville, 320 Sansome
Frontier Star M Co, (B).....	1.....	1c.....	March 27, Apr 11, May 4.....	M O Lohr, 137 Montgomery
Jackrabbit M & M Co, California.....	1.....	5c.....	Mar 5, April 9, April 31.....	J F Holling, Crocker Bldg
O born Hill M Co, Cal.....	2.....	25c.....	April 2, May 7, May 25.....	R E Grayson, 331 Pine
Oreman S M Co Nevada.....	70.....	10c.....	Mar 6, April 10, April 30.....	Gen D Edwards, 414 California
Potosi M Co, Nevada.....	41.....	25c.....	Mar 5, April 16, May 2.....	Chas E Elliot, Nevada Block
Savage M Co, Nevada.....	84.....	25c.....	Mar 5, April 9, April 31.....	E B Holmes, Nevada Block
Scorpion M Co, Nevada.....	5.....	5c.....	Jan 10, April 13, May 4.....	Geo E Splaney, 310 Pine
Sis Iyou Cons Quicksilver Co, California.....	8.....	7c.....	Mar 2, April 6, April 27.....	Edw F Stone, 366 Pine
West Cons. Cal. & Va., Nevada.....	2.....	25c.....	April 10, May 12, May 31.....	P H Andrews, 334 Pine

COMPANY AND LOCATION.	MEETING.	SECRETARY AND OFFICE IN S. F.	DATE.
Deer Creek M. Co., Cal.....	Special.....	A. W. Robinson, 26 Montgomery	April 19

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Water can't get through and rot the duck.

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Assessment Notices.

SUPERIOR MILL AND MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Placerville, El Dorado County, California.

Notice is hereby given that at a meeting of the Board of Directors held on the 13th day of March, 1894, an assessment (No. 1) of Twenty cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the delinquent at the office of the company, Room 17, 315 Pine street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 23d day of April, 1894, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 14th day of May, 1894, to pay the delinquent assessment, together with the cost of advertising and expenses of sale. By order of the Board of Directors.

R. W. HEATH, Secretary.

Office, 318 Pine St., Room 17, San Francisco, California.

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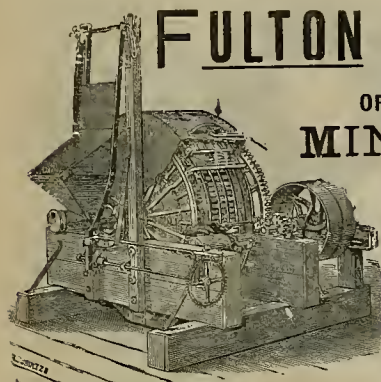
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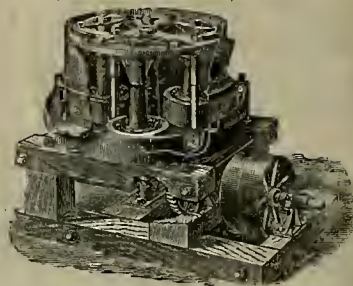
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VOLUME LXVIII.
Number 18.

SAN FRANCISCO, SATURDAY, APRIL 21, 1894.

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Universal Brass Worker.

Mechanical ingenuity keeps pace with advancing requirements. The illustration on this page is of a Universal brass worker, made by the Lodge & Shipley Machine Tool Co. of Cincinnati, O., which is of practical interest to all machinists.

Its main advantages are: After the machine is oiled and started in the morning it need never be stopped for the purpose of putting in or taking out work. The spindles are so arranged as to perform the five operations necessary to a valve body, viz.: boring, facing and threading of the two ends, and boring, facing, turning and trimming body seat, and threading of same, and the final seating of the valve. It may also be used on stuffing-box nuts, making two at a time, and performing all the operations. It also may be used on bonnets and stems. The machine is very powerfully geared. While boring spindles run 600 revolutions, the tapping spindles run only 150; thus giving slow speed and great power, at the same time preserving the edge and the temper of the taps used.

Universal chucks are fitted to each spindle, which center the tools perfectly. In addition to this the inner ends of spindles are fitted with milled slots to receive flatted end of shank, which makes a positive drive for same in addition to the grip of the chucks. The revolving chucks are fitted on a revolving table, and this table is indexed into six divisions. The extra chuck is used for putting in rough and taking out finished work. Each of these revolving chucks is indexed and all come in absolute alignment with each of the five spindles. The index lock key for the revolving table is operated by a treadle near the base of the machine, while the lock key for each of the revolving chucks, which are carried with the revolving table, is lifted by the knee of the operator while the chucks are being revolved. The boring spindles are geared three to one, and the tapping spindles nine to one. A central upright shaft fitted with two gears drives both boring and tapping spindles.

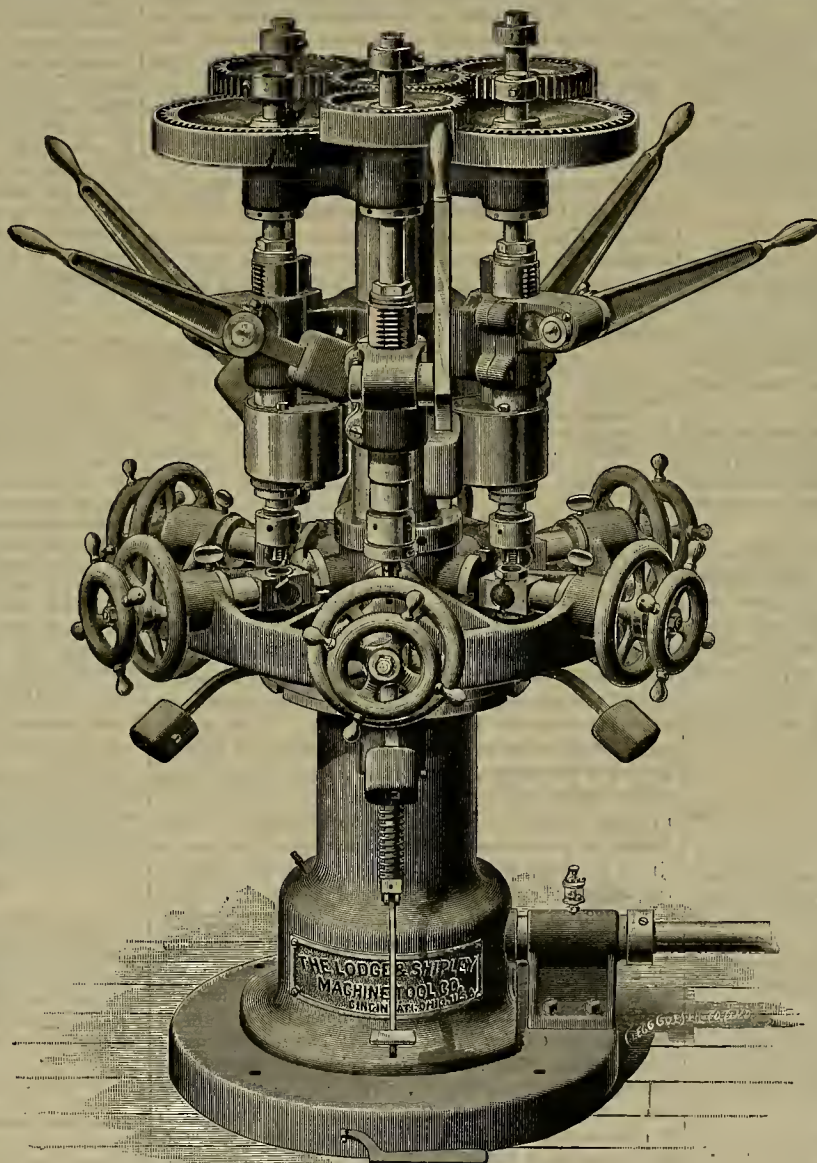
The tapping spindles when not in use revolve in an opposite direction to that assumed when tapping. The moment the tap touches the work it reverses and moves forward, and when at the proper depth releases automatically and returns to its former position. Power is taken from a horizontal shaft, having a three-step cone and a four-inch belt, and is engaged by means of a steel bevel pinion into one of a larger diameter.

UNDETERRED by the result of the Brussels gathering, the Mexican Government is asking that an international monetary conference be held at the City of Mexico to attempt an adjustment of "the silver question."

SILVER and wheat are always affected simultaneously. When one goes up or down, the other does likewise. They both rose together a little during the past week.

From the Okanogan Country.

Judge Ferdinand P. Wehe, one of the famous four Wehe brothers, who have done so much for the development of the mining interests of the Northwest, is in the city. He reports mining matters at Loomiston, Wash., his home, encouraging. In that vicinity are the Black Bear, Tribune, Spokane and War Eagle, each with a well-



THE UNIVERSAL BRASS WORKER.

defined ledge of free-milling ore, and the Mayflower, Sherman and Sacramento group showing smelting ores, all being rich in both gold and silver. Judge Wehe is now awaiting the arrival of ore to place on exhibition at the Midwinter Fair; and, like all Washingtonians, is enthusiastic over the future of his adopted State.

THIS time it is Prof. Falb of Vienna who comes to the front telling when the world will end. He says a comet will smash us November 13, 1899, and that will end the world. All right; we'll get along just as well without it.

The Electrolytic Process.

The times are prolific of new ways and means for the extraction of gold simply and economically, and from London come accounts of an electrolytic process which, it is claimed, is capable of satisfactorily extracting the gold from all classes of gold ore, including the most refractory. Electro-chemical processes are no novelty, and a great

deal of effort has been expended in demonstrating their value. As in other modes of extraction, it has been found that different processes are best adapted for different kinds of ore, and such experiments are necessarily very costly, and when the character of the ore changes it upsets the plans of the reducer. The process so well commended in London seeks to secure the circulation of the pulverized ore between positive and negative poles by setting a screw propeller vertically near the bottom of the tank. For a solvent is used a dilute solution of potassium cyanide. The electrolyzed gold is collected by a bath of mercury constituting the negative pole, and the positive pole—the fourth quantity in the equation—is a mass of powdered rosin. Mixed with water the ore in the tank comes in contact with the mercury bath at the bottom. The revolving screw starts the mixture circulating down the center of the tank, touching the surface of the mercury, again traveling up the conical sides of the tank on which is laid the positive pole and so down again in the center, where it is forced into the mercury, thus, it is claimed, causing every particle of gold to be absorbed and electrolyzed, so that ninety per cent of the gold is secured. The inventors of the process say that the ore needs only to be crushed before being placed in the tank; that whether free-milling or rebellious ore the treatment works equally well; that there is little or no waste, the same chemicals admitting of repeated use and that one operation will suffice for the entire contents of the tank.

So much is claimed for this process in the important elements of efficiency, simplicity and cheapness, that it will attract considerable attention among mining men the world over, and if it stands the practical test of merit will come into general use.

THE *Amador Record* is a good illustration of what a clever newspaper can do in judicious and enterprising presentation of facts and figures showing the advantages of the locality from whence it derives its support. It has recently issued a mammoth illustrated edition, comprising a complete write-up of the county, that would be commendable to any newspaper anywhere, and which is a splendid showing for *Amador* and the *Record*. Every industry in the vicinity and every work of any magnitude is faithfully and intelligently portrayed, and great credit is due the paper that made such an undertaking possible.

UNDER the present tariff there is about \$2.50 worth of wool in a fine suit of clothes.

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San Francisco, April 21, 1894.

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Idle Men and Idle Money.

One morning this week the city dailies had two items—one, that the San Francisco banks had \$15,000,000 deposited that they could not use nor lend; the other, that the second division of the "California Industrials," the army of the unemployed, 500 strong, were to start for the East, via Mojave, the city providing for their transportation.

The simultaneous announcements is a sad commentary upon the condition of the times. Plenty of money, the bank vaults bursting with coin, and idle men leaving the State—assisted emigrants. The men were out of work; the money is "out of work" too.

There is just as much money as ever—more in the banks than ever before. There is just as many deserving men looking for work—more than ever before—but there is a universal lack of confidence. The country needs a big dose of faith cure. Everybody has grown afraid that if a dollar is let go it will never again be seen, and the result is tersely exemplified in the fact of a paralysis of investment and a plethora of coin; men and money both idle.

A Call for Aid.

To the Miners of California and those Interested in the Success of the Mineral Industry of the State:

GENTLEMEN: The committee having in charge the mining exhibit of the California Midwinter International Exposition have labored ardently to try to raise money enough to carry on the exhibit to July 1, 1894, but find that they are short the amount of \$225,568.

San Francisco has been more than generous in the support of our mineral exhibit. She has had many calls upon her in aiding different interests at the Midwinter Fair, also in assisting the unemployed through the last winter, and we cannot at the present time raise any more money here, so we are compelled to call upon the miners of California, and the merchants and those interested in the welfare of the mineral industry, to assist us as far as they possibly can toward carrying on the mineral exhibit to July 1, 1894.

Yours, respectfully,

By W. C. RALSTON, Secretary. EXECUTIVE COMMITTEE.

SAYS the Downieville Mountain Messenger of the 14th:

George Ohleyer is again pressing himself to the front in defense of the anti-debris cranks, and his wise (?) sayings fill almost one entire column of last Friday's Appeal. Ohleyer's object is so plain that it has long been a wonder to us that the farmers who are "putting up the stuff" don't drop on him. It is big money in his pocket if he and others of his kind can only keep up the row between the farmers and miners; and, whenever he thinks things are cooling down a bit, he proceeds to stir them up again. If it were not for this class of vampires sucking the valley people's blood and emptying their purses, the differences would have been patched up long ago and everything now be serene. The valley folks will drop on him and his schemes before long, we hope.

WITH a partial understanding of the subject, the London financial journals say that the future of silver depends upon the reopening of the India mints,

Recent Work of the Commission.

The California Debris Commission has issued permits to work to the miners or operators of the Eureka hydraulic, the Spanish Hill gravel and the Spanish Hill hydraulic mines, in the vicinity of Placerville, and to the Grub Flat mine, near Meadow Valley. A temporary permit for the present season only has been given the Quincy Water and Mining Company, using a log dam to restrain the debris. Meanwhile the company proposes to build a stone dam in Spanish creek for permanent restraining use.

The application of the Badger Hill mine, near Spanish Ranch, has been held in abeyance till the Quincy Company's dam is built. The cost of the dam will be shared by both companies.

Authorization has been issued to the Kate Hayes Company to put restraining work in the Manzanita mine, near San Juan, utilizing an old hydraulic pit therefor as a settling reservoir. There is an old tunnel under the pit, to which a shaft will be sunk, and through which the surface water will run, similar in substance to the company's works at the French Corral mine.

Lient. Gillette has returned from a visit to the Excelsior mine at Smartsville. While there he sampled the water coming in from the ditch, and also flowing out from below the impounding dam. The ditch water carries sediment; the outflow having considerably less than the inflow. The old channel at Timbuctoo is now used for a discharge for the Excelsior's tailings, being a sort of settling reservoir.

The Excelsior's operations are at present more extensive than those of any other mine running under the requirements of the Commission. It is using upwards of 1500 inches of water, and, during March, washed 60,000 cubic yards of material, chiefly gravel.

Silver Industry of Chili.

A report prepared by direction of the Sociedad Nacional de Minería (the National Mining Society) on the silver industry of Chili was recently presented to the Government of that country. A synopsis of this report has been received by the Bureau of the American Republics in Washington, D. C. At the date of the report the production is estimated thus:

	Marks.
The silver exported from Iquique, Taltal, Caldetia, Coquimbo and Carrizal reaches and exceeds.....	300,000
The silver extracted in the Bella Vista Works, Antofagasta, from ore from Chilean mines exceeds.....	180,000
The Las Condes, San Jose de Maipo and other fields yield upward of.....	100,000
Total.....	580,000

To this quantity the compilers of the report add:

From Huanchaca.....	350,000
From Oruro.....	222,000
Total.....	1,152,000

Although neither Huanchaca nor Oruro are Chilean fields, the latter belong exclusively to Chileans, while of the 320,000 shares of the former 101,000 are held by Chileans, and of the "acclones al portador" (share of stock payable to bearer) four per cent is held by Chileans. Therefore, the compilers of the report consider that 35 per cent of the production of Huanchaca, calculated in round numbers at one million marks, belongs to Chileans. The grand total of 1,152,000 marks is equal to 264,960 kilograms of silver. Taking the production at 1,100,000 marks, and the price at £1 13s per mark, we have a total of £1,243,000, which at 15d, the rate of exchange at the date of the report, is equal to \$19,888,000.

From the facts given in the report it would appear that the prospect for remunerative working of the Chilean silver mines is not encouraging, with the exception of a few exceedingly rich mines. Commenting upon this feature of the report the *Chilian Times* says: "The consequence of such a state of affairs as that depicted by the report is not very agreeable to contemplate. The paralyzation of the silver industry would mean the withdrawal of \$20,000,000 of 15d from the annual exports. It would mean the cessation of trade with Bolivia, the loss of a chief source of revenue to the steamship companies, and the partial ruin of agriculture. In order to prevent a catastrophe of this nature the compilers of the report propose a double standard, without any legal ratio between the two metals. And they go on to say: The solution would be obtained in an agreement to coin in all America a money to be current in all the States, of a fixed weight and standard, to be coined by the Government only. The proportion to be coined by each Government might be fixed by agreement, but silver-producing countries would probably prefer not to be bound by a stipulation of this kind. It will be seen from these extracts that the compilers of the report favor bimetalism, and in another part they advocate free coinage of both metals."

Digest of Recent Court Decisions.

Exception of Mines and Mining from Town-Site Patent.

In order to except mineral lands from the operation of a town-site patent, they must be known to be valuable for mining purposes at the date when the patent takes effect; and it is not sufficient that they have once been valuable for mining purposes, or are afterward discovered to be still valuable therefor. When a quartz ledge, known to be gold-bearing and to have been profitably worked prior to the acquisitions of a town-site patent in the year 1866, and not then worked out, is situated within the exterior boundaries of the patent "the rights of the Government and its mining grantees are not limited to such actual mining or tunnel possession as may have existed before the town-site patent, or to any continuance of a mining claim or possession by prior locators or their grantees, but the Government owns and can grant the right to any quartz mine or gold-bearing ledge which was known to exist and to be valuable for minerals before the town-site patent was obtained, and which was not worked out when the town-site patent was obtained; and the rights of a subsequent locator under the Government by virtue of its reservation of the mine, and of the mining acts of 1866 and 1872, include a reasonable quantity of surface for the convenient working of the ledge, not exceeding three hundred feet on each side thereof."—*Dower vs. Richards* (Supreme Court of the United States), 14 Su. Ct. Rep. 452.

Construction of Deeds for Mineral Rights.

A deed which conveys "the following tract of land, situate," etc., "that is, the one-half of the mineral interest in the said land" (described by notes and bonds) to have and to hold "the one-half of the mines and minerals" therein, must be held to convey the grantor's entire mineral interest, even if considered upon its face alone; but especially so in the light of the facts, known to both parties, that the grantees had already purchased the fee of the lands for the purpose of making a sale to a company having sufficient capital to develop its mineral deposits, that the sale had fallen through because of the grantor's claim to an interest in the mineral rights, and that the grantees desired to purchase the same in order to perfect and make salable their title. The words in a deed cannot, as a general rule, be added to, explained or contradicted by extrinsic evidence, but where any part is indefinite or ambiguous, or cannot be fully understood as to the intention of the instrument, it may be construed in the light of surrounding circumstances, in which may be considered the position and relation of the respective parties, the objects of the conveyance and the subject matter at and subsequent to the transaction. A court may avail itself of the same light which the parties possessed at the time the deed was executed, and may consider previous and contemporary transactions and facts to ascertain the subject matter, and the sense in which the respective parties may have employed and understood the particular expressions in the deed.—*Brown vs. Cranberry Iron & Coal Co.* (Circuit Court, W. D. North Carolina), 59 Fed. Rep. 434.

Assumption of Risk by Employee.

While several cars in a mine were being propelled to the shaft one of them ran through a switch, left open by mistake, onto a side track, killing an employee. The switch was left open by a gang of night men, and it was the duty of the employee to see that it was properly adjusted for the work of the day. His failure to have the switch in proper condition caused his death. He was an experienced miner; had been employed in the mine for a year and a half and was familiar with the switch and the place where he worked; knew that the night men often left the switch open, and that loaded cars were frequently shoved to the shaft, as this one was, without being attached to other cars or to the cable; and he neither made any complaint nor asked any charges. By so doing he assumed the risks incident in such condition of things.—*Backman vs. Consolidated Coal Co.* (Supreme Court of Iowa), 57 N. W. Rep. 839.

Location and Acquisition of Placer Mining Claim.

It is not necessary that a separate discovery, separate marking of boundaries, separate recording and separate work should be made and performed on each of the 20 acres contained in a 160-acre placer claim, authorized by Revised Statute U. S., to be located under one location by an association of persons.—*McDonald vs. Montana Wood Co.* (Supreme Court of Montana), 35 Rep. 668.

Mines and Mining Liens.

When the statutes as amended by laws 1889, giving to persons who do work on mining property operated by lessees a lien for their labor, unless the owner files for record, "before the commencement of work under the lease," a notice that the property is being worked under a lease does not apply where the lease was executed and the work performed before the passage of the act.—*Gardner vs. Resumption Mining and Smelting Co.* (Court of Appeals of Colorado), 35 Pac. Rep. 674.

Liability of Corporation for Acts of General Manager.

The general manager of a mining and reduction company employed men to open a mine of his own, and to construct a wagon road and ore chute from such mine to the company's reduction mill, transferred miners and tools from the company's mine to his own; reduced his ore at the company's mill, and sold it mixed with ore from the company's mine. As he acted within the scope of his employment, though without the knowledge and in fraud of the company, the company was liable for the wages of the men who were employed by him in the name of the company, and who believed that they were serving the company when working for him.—*Orn Mining and Milling Co. vs. Kaiser* (Court of Appeals of Colorado), 35 Pac. Rep. 677.

FOUR exploring parties are fitting out for the North Pole this spring, and there is the usual supplementary stir among those who will naturally constitute the "relief expedition" and the tertiary formation known as the "second relief expedition" to look for the members of the first relief expedition.

General Mining Notes.

The Gem mine (Idaho) has resumed, giving employment to 150 men.

The Goler mines, in Kern county, have recently imported thirty dry washers, made in Porterville.

The California Debris Commissioners have appointed W. B. Story, of Nevada City, assistant engineer for the Commission.

At a meeting of stockholders of the Idaho Mining Company on the 12th inst., the company as a corporation was voted out of existence.

The world's gold production for 1892 was \$138,861,000. The U. S. Mint Bureau estimates the gold production of the world for 1893 to be \$150,000,000.

In the Ashland, Or., mine a true fissure vein has been found at a depth of 575 feet, and the mining industries of that section are experiencing a "boom."

The Union Pacific Railroad Company has decided that on and after May 12, 1894, the minimum weight on ore carloads will be 20,000 pounds instead of 16,000 pounds as heretofore.

The managers of the mining exhibit at the Midwinter Fair are going to give a purse for a single and double-handed drilling contest, free for all. The purse will be about \$400, the first prize to be \$100.

The South Keystone Consolidated Mining Company has incorporated with a capital of \$200,000, of which \$20,000 has been subscribed. Directors—J. A. McIntire, John C. Hughes, H. K. Hall, William Roush and L. T. Hatfield.

The Mountain Lion Mining and Milling Company of Missouri Flat has incorporated with A. M. Brown, J. W. Farquhar and Geo. H. Rivers as directors. The capital stock is \$10,000, and headquarters are at Grant's Pass, Or.

The Idaho Statesman says a sale has been concluded of Ben Wilson's mining property—placer ground, ditches, machinery, etc.—on Grimes creek, Idaho, for between \$250,000 and \$300,000, to J. C. Kemp Van Ee, the latter representing a strong London syndicate.

The Surprise Gold Mill and Mining Company was incorporated last Monday in San Francisco. Directors—F. K. L. Bonte, F. R. Lemky, Louis Andet, C. C. Cotton and John Gillison. Capital stock, \$1,000,000, of which \$100,000 has been subscribed.

The first steamer load of ore from the LeRoi mine, in Trail creek district, Washington, was taken down the river from the Trail landing to Northport last week. There were 987 tons at the landing, as the result of the winter's work, the steamer taking away 64 tons.

At the recent annual meeting of the Montana Elkhorn Mining Company in London, the chairman in a speech explanatory of the report said that the company was prepared to keep its mines in operation, and expected to make a profit as long as the price of silver did not fall below 20d per ounce.

A DEMINO, NEW MEXICO, dispatch says: Jack Redding and David Harper, owners of the celebrated Dos Cabezas mine in old Mexico, became involved in a quarrel and shot and killed each other. These make five deaths of the owners of this property, which seems to carry with it a strange fatality. Only one owner survives. Five others have met violent deaths.

The Chassell Gold Mining Company has been incorporated by George Peace, John H. Rule, Louis Sponheim and Osmund A. Sponheim of Basin, and George Robertson of Butte, Montana. The company is organized to do general mining business, and the capital stock is fixed at \$500,000, divided into half a million shares having a par value of \$1 each. The stock is non-assessable.

JAOOME, the largest mining camp in Arizona, was entirely destroyed by fire last Tuesday morning. All the business houses are gone, including the records and other property of the postoffice. The fire could not be controlled owing to the heavy wind that prevailed. The loss is estimated at \$50,000, with very little insurance. Many miners and their families are without homes.

TWENTY years ago a seat in the San Francisco Stock and Exchange Board was easily worth \$25,000. That was in the boomy days of the Bonanza mines. The late Martin Bacon left among his assets a seat in the Board, and his widow, May E. Bacon, has been given permission to sell it with other personal property at private sale. It is part of the estate of her children and is appraised at \$1000.

The annual meeting of the stockholders of the Yuba River Mining Company was held on the 10th, the following board of directors being elected: D. E. Matteson and James Vineyard of Nevada county, and E. J. Crowley and Nelson Wilcoxon of Sacramento. The board organized by electing D. E. Matteson president; Jas. Vineyard, vice-president; J. M. Wiley, secretary. Nelson Wilcoxon will be superintendent.

STEPHEN MOORE, superintendent of the Home mine, down Deer creek, says the Nevada City Herald, exhibits a couple of pieces of quartz which came out of the Home years ago, when the old company was working the mine. The pure gold sticks out all through it, and the pieces, no larger than a man's fist, contain probably \$40 worth of gold each. Mr. Moore hopes that he will soon run into about an acre of that stuff.

RECENTLY while the men in the employ of Jackson & McCue, near Folsom, were at work running a drift in the mine, they tapped an old shaft and drift which was filled with water. The minute their picks struck through, a flood of water rushed in, sweeping them through the tunnel to the pump shaft, where they climbed the iron pipes and escaped. The steam pumps have been busy ever since reducing the water, and have the mine dry again.

THAT the Daisy Hill mine will soon be working, the Grass Valley Union says, is a certainty. Recently the first installment of \$5000 was paid by the company organized for working the mine, of which C. L. Kingsley is one of the heaviest stockholders. The Daisy Hill is situated some 200 or 300 yards west of the Oshorne Hill mine. In the early days it was fabulously rich, the ore averaging from \$20 to \$75 a ton, while considerable rich specimen ore valued at \$600 per ton was extracted. The mine was sunk to a superficial depth of 260 feet. Like all

other mines on the famous Osborns Hill it will probably increase in value as depth is attained. George Mainhart, M. C. Taylor and Chas. H. Taylor were instrumental in the formation of the company to work the Daisy Hill.

THERE has been exaggerated reports concerning the magnitude of the Cripple Creek strike. The Mining Record says it affected the pockets of the few rather than of the many. Undoubtedly the owners of the few mines closed down are nearly as willing for them to remain so until the railroads reach there, as the striking miners are to prevent their fellow-men from working at living wages. Two-thirds of the real laboring men of that camp are at work and assisting in keeping up its developments.

THE following from the Jacksonville, Or., Times expresses the sentiments of all concerned: "The special act for the suspension of assessment work on mining claims, passed by Congress last August, should be continued for 1894. The times seem to be harder than ever in most mining sections, especially where silver is the principal product. Thousands of men who have been thrown out of work are industriously prospecting for gold mines, without much means at their command for prosecuting the work, and should be given all the encouragement possible."

THE famous Cripple Creek has a rival in the new camp of Balfour, Colorado. Although the town is only about three months old, it now has about 175 houses and is staked for a radius of five miles in every direction. Cripple Creek people who have visited the field say the indications all point to the same results as in the older camp, the belt being the same and the rock formation also. The only difference is that in Balfour all the shafts strike water. The first shipment of machinery to this camp was made about two weeks ago, and crowds of prospectors are flocking to the new field.

A RECENT LETTER from the Commissioner of the General Land Office says: Mining lands were excluded from the grant to the Oregon and California R. R. Co. so that the discovery of the mineral character of a tract within the limits of said grant, at any time prior to the issuance of patent, serves to except such tract from the operation of the grant. On corroborated allegation that certain land patented to the company is excepted from the grant by reason of the known mineral character, a hearing may be ordered to ascertain whether the facts justify judicial proceedings for the recovery of title.

ARTICLES for the following domestic corporations have been filed with the Washington Secretary of State: Spectacle Lake Gold Mining Company, Loomis, Okanogan county, Washington. Capital, \$1,000,000; 1,000,000 shares of \$1 each. Incorporators—George W. Adrian, Walter M. Adrian and William Foulke; to carry on business of mining. Eureka Placer Mining Company, Leavenworth, Okanogan county, Washington. Capital, \$24,000; 240 shares of \$100 each. Incorporators—John Bjork, Matthias Donehoe, S. Sivertson, L. Y. English, O. Y. Bjork, Frank Lewis; to buy, sell and operate placer mines.

IN the Cour d'Alene district the Poorman mine has resumed work with 250 men. The Bunker Hill mine now has 365 men employed every day. The Gem mine was opened up a week ago and is now working 100 men. The Standard mine is carrying 70 men. The Tiger mine has increased its force from 30 to 74 men. Even the Last Chance mine is expected to resume operations soon, as everybody believes the recent decision of a parallel Montana case will soon give the property to its Spokane owners. All over the Cour d'Alenes people are taking new courage, money is growing more plentiful and conditions in general are growing better every day.

A MOVE is reported at Mont Idaho to work a portion of the bed of Salmon river for gold. Near that point the river makes a large bend, and the plan is to straighten the river at that point by running the water through a large tunnel and then working the bed of the big semicircle. It is believed there are rich deposits of gold all along the bed of the river and the promoters of the tunnel scheme are confident a fortune awaits them if their efforts to change the course of the stream prove successful. The tunnel would have to be about a quarter of a mile long. With the water thus diverted there would be about three miles of the channel that could be operated now.

TWO Vanderbilt mining men, H. Randolph and H. M. Stevens, went to South America last fall to inspect the mines from which such rich reports are made. This week, says Bulletin, after a five months' stay, the two gentlemen returned. They went 1200 miles into the interior of Colombia, passing into Venezuela, crossing the equator. Their report is entirely unsatisfactory, as they saw nothing which would indicate great bonanzas. The richest mine they saw has been worked over 200 years, and has never produced a million dollars. Some small propositions were fair, but not any better than can be found in dozens of camps in the United States. The facilities for working them are as bad as could be represented, and their advice is for the United States miner to stick to home.

CORRESPONDENCE of the Victoria Colonist from Fort Sheppard, B. C., says: "American mining men in this country complain bitterly of what they describe as the petty and unfair interpretation placed by the Dominion custom authorities upon the clause of the act providing for the free admission into Canada of 'mining machinery which is, at the time of its importation, of a class or kind not manufactured in Canada.' They claim that in spite of this provision, no such mining machinery can come in duty free. They instance the special patent steel piping required for hydraulic working, carefully riveted and fixed to withstand great pressure, which is refused admission on the ground that piping 'somewhat similar' is made in Canada, or that some portions of it, such as the rivets, are so made. These gentlemen appear inclined to assume that this is intended as a special discrimination against them and their manufacturers, forgetting that they are not the only users of such machinery in British Columbia nor the sole manufacturers in the world. The numerous Canadian companies operating by hydraulic works here and the heavy imports of mining machinery from the mother country are subjected to precisely the same treatment, without favor or affection. But it would seem that there is some ground for the complaint, and it is believed that all the customs officers in British Columbia are in favor of a more liberal interpretation. At present duties are levied upon all machinery coming in, and the question of a refund has to be thrashed out with the Ottawa office, causing delay and irritation.

General News Notes.

SMALLPOX is epidemic in Chicago, and there are many daily deaths.

THE failure of Mark Twain as a New York book-publisher is announced.

MOORELL, Chris Evans' assistant, has been sent to the Folsom State prison for life.

A \$300,000 FIRE totally destroyed the Sacramento electric power plant last Wednesday.

ALL the coal miners in the country are reported to be getting ready for a strike to begin to-day.

IT is now expected that in the Senate deliberations on the tariff bill the duty on lead will be increased.

"THE Great American Pie Company of Chicago" is about to be placed in the hands of a receiver. There need be little difficulty in finding a receiver for pie.

THE down stage between Angels and Milton was held up in the regular orthodox fashion last Monday. Between \$1800 and \$2000 was got out of the treasure-box.

THE North American Navigation Company has ceased operations and will no longer vex the Pacific Mail Steamship Company. There is money enough on hand to pay all claims.

Mrs. PULLMAN of Fort Scott, Kansas, the only city woman treasurer in the country, is "short" \$1500 in her accounts. She is honest, but claims that her books have become "confused."

THE California First Division of the Industrial Army is walking through Illinois. The cry is still "Oo to Washington." The Coxy contingent are almost within sight of the national capital.

THE International Telephone Construction Company of Chicago has been incorporated for the purpose of building telephone exchanges for the Harrison Company, which proposes to revolutionize the telephone business.

THE strike on the Great Northern Railroad, which is a fight between two rival labor organizations, is still on, and the miners along the line of the road are being discharged by hundreds because of inability of the mining companies to secure ore transportation.

AFTER a thorough investigation the Secret Service pronounces as "absurd" the recent widely reported statement that counterfeiters had coined 500,000 real silver dollars at Omaha, which the authorities could not tell from the genuine output of the United States Mints.

THE registration bureau of the internal revenue department has already issued 38,000 Chinese resident certificates, with several thousand yet to apply. As the census shows but 35,000 Chinese in this district, it is evident that many thousands of Celestials have been smuggled in.

A NEW SEIGNIORAGE BILL has been introduced in the House, providing for the coining of the seigniorage and so amending the Resumption Act that three per cent bonds would in future be issued in lieu of four and one-half and five per cent. It is said to meet with Secretary Carlisle's approval.

THE franks at the Carnegie Works, wherein defective armor plates for the government cruisers were foisted upon the national officials, are to receive strict investigation. It was supposed the matter had been condoned by the payment by Carnegie & Co. of \$140,000, but a rigid investigation has been ordered by Secretary of the Navy Herbert.

THE United States is the owner of a rolling mill at Charlestown, Mass., and of another at Rock Island, Ill. The rolling mill at the Charlestown Navy Yard has recently resumed operations. Orders have been received to have the iron chain making rolled at this yard. The cable for the three new warships, Oregon, Massachusetts and Indiana, will be made there.

THE McGarrahan claim, which has been a national institution for the last thirty years, will probably cease to be a topic of congressional attention much longer. The famous claimant has been taken to the Washington, D. C., hospital in a state of physical collapse. Time was too much for him, and his famous career is but another illustration of the hopelessness of a case that awaits governmental favor.

THE United States Corporation Bureau, of Chicago, makes the following exhibit of new corporations incorporated in the United States during the month of March, 1894:

Total corporations, 1180.	
Total capitalization, \$182,130,860, distributed as follows:	
Mercantile and Manufacturing Companies, 668.....	\$52,779,525
Banks and Investment Companies, 16	707,000
Gold, Silver and other Mining and Smelting Companies, 92.....	63,681,000
Coal and Iron Companies, 17.....	3,015,000
Light, Heat, Power and Transportation Companies, 57.....	19,305,000
Building and Loan Associations, 31.....	19,173,000
Irrigation Companies, 12.....	428,500
Miscellaneous, 287.....	23,141,835

IT is proposed to ask Congress for legislation authorizing an investigation by the Labor Bureau into the influence of the use of machinery upon labor and the cost of production, the relative productive power of hand and machine labor, the cost of manual and machine power, as they are used in productive industries, the effect upon wages of the use of machinery operated by women and children, and whether changes in the creative cost of products are due to a lack or a surplus of labor or to the introduction of power machinery. No similar investigation has ever been attempted on any such scale of magnitude as proposed.

THE "stories of American manufacturers," which the Census Bureau is issuing in bulletins, is brought down in the latest number to manufactures and mechanical industries, each of which reported a product valued at \$30,000,000 or more during the year ending May 31, 1890. There are 287,501 establishments reported for the 67 industries presented in this bulletin, or 80.90 per cent of the total number of establishments in the United States. These establishments show \$5,249,139,842 of capital invested, or 80.45 per cent of the total capital for all classes of industry. They also report 3,370,557 employees, receiving \$1,311,188,882 wages, or 79.17 per cent of the employees and 79.34 per cent of the wages for all industries. The cost of materials used was \$4,373,402,066, or 82.84 per cent of the total materials of all industries. The value of product was \$7,618,836,200, which was 81.31 per cent of the total product of manufactures in 1890.

Method of the Capillary Electrolytic Sluice in the Extraction of Gold.

Written for the MINING AND SCIENTIFIC PRESS by J. H. Jory.

To Californians engaged in gold extraction the fact that under certain conditions of mining, milling and varieties of ore enormous losses in gold occur is well known; the causes of these losses are sometimes obvious, but are much oftener obscure, unsought for and unknown even by the mine superintendent. Without entering into any definite discussion at this time as to the amount of gold thus lost or the causes leading up to the result, I will only say that the loss is great and unavoidable under the established systems of extraction, and may be comprehended fully under the one term "float."

Coarse gold, whether in refractory or free-milling rock, or in hydraulic mines, may be saved by the present methods of milling and sluicing; but when the ore is crushed to such fineness as to liberate the minutely divided particles of gold, float is the resulting product, which can no more be saved by the old methods than can the motes that float in a beam of sunshine. That the arrastra, though slow and imperfect in method, is oftentimes far superior to the stamp mill in the percentage of value obtained, is well known and admitted. The reasons are not so well understood, though sufficiently clear when the process is considered. In the first place, the fineness to which the pulp is reduced in the arrastra liberates more of the precious metal than is usually the case in the stamp mill where the amalgamator has the fear of float before his eyes. In the second place, the stage at which the mercury is applied being that when the pulp is of the consistency of paste, renders unnecessary any reliance on gravity for the amalgamation of the fine particles. This catching at the straw of gravity being the futile aim of all established amalgamating methods except the arrastra, until the rise of the capillary electrolytic sluice produced a more scientific process. This new method takes hold of the operation of gold extraction at the critical point where the efficiency of the quartz mill and the hydraulic sluice leaves off, and saves all that is lost in those processes. In method it applies to flowing streams, containing gold in minute mechanical division that certainty of result now obtained in the analogous processes of electro-plating wherein fluids at rest containing metals in solution deposit those metals on the plates in circuit. Amalgamated copper plates set almost vertically in a sluice box in such a manner as to form capillary passages between the plates, are employed. The particles of precious metals held in suspension are forced into these passages and are gleaned from their containing fluids as completely as the particles of dirt are removed from the water when passed through the filter.

The capillary action caused by the contiguity of the plates is one essential feature of this process; that force increasing the affinity between the plates and the metal to be extracted. But the most powerful action of the sluice is the electrolytic force produced by passing a current of electricity through the series of plates and the flowing fluid containing the particles of gold. This action is twofold, first, in carrying and adhering to the plates every particle of gold, silver or mercury contained in the flow; and, second, in decomposing all films of oxides or sulphides that might otherwise prevent a free amalgamation. An alternating current has been found the most effective and satisfactory for this purpose, causing the precious metals to adhere to both surfaces of each plate free from all extraneous particles. The efficiency of this process in saving the fine gold from free-milling rock in quartz mills, beach mining and in hydraulic mining renders it of incalculable value in those operations, but in its application to the extraction of gold from refractory ores it is of still greater value, in that it will enable numerous mines to be worked at a profit that are now valueless.

It is not difficult of proof that gold exists almost universally in a metallic state, even in ores of the most rebellious character, and that the metal may be freed from its matrix by reducing the ore to a very fine state of mechanical division by mechanical means. Under the established systems, however, it is—as before stated—impossible to extract gold in this minute division from the slimes in which it is suspended, because it is almost unresponsive to the force of gravity. But in the capillary electrolytic sluice the forces employed act on particles not only of the finest mechanical division, but even on particles chemically divided, as demonstrated in electro-plating. The capillary passages of this sluice belong somewhere in the neighborhood of one-fiftieth of an inch in width, its capacity is, of course, limited to fine gold, and in the case of beach mining and hydraulic mining, screens are provided to remove the coarse sands from the flow before entering the sluice. This process does not, therefore, abolish the methods now employed, but is supplemental, except that such apparatus as sizers, concentrators and amalgamators may be entirely

dispensed with; together with the slow and costly processes of chemical extraction now employed.

There is but one element of cost entering into the process of the capillary electrolytic sluice above that of the simplest free-milling methods now employed, viz., the extra power required to produce the electric current, and the floor stamping of the ore requisite; when, however, the greatly increased product and the certainty of results are considered, this is scarcely to be thought of. But in the reduction of refractory ores the gain is so incomparable that a tabulated statement would appear almost incredible.

South Africa's Gold Fields.

From far-off Johannesburg, Ed Russell, who recently went there, writes to Thos. Winsor regarding that country concerning which there is so much present inquiry. He says:

"The labor market is now overdone in Johannesburg. Lots of men are lying around who have been unable to secure employment for months. Many of them are from Australia, and they have to borrow money to return home. A great many Americans also find it difficult to get anything to do, although they are preferred to almost any other class, especially in the mines. This is probably due to the fact that the principal mines are owned by Americans and operated by American managers. The only class of men safe in coming here are machloe men—good drill machine men, I mean, and good blacksmiths, of course. Carpenters, bricklayers, etc., might find work, but they are better away if they know when they are well off. Railway men are 'not in it,' as wages are low. I will say, however, that I think prospects will be better later. At present the best thing to do is to stay away. If one does want to venture, let him go to Natal, Delago Bay, or some other east-coast town. There the chances are much better, for the simple reason that everybody comes direct to Johannesburg."

"As to the climate, if you went to sleep to Arizona and woke up anywhere on the road between here and Cape Town, you couldn't tell the difference. About 300 miles from here you strike a splendid grazing country, all the world like northern California and southern Oregon. The soil is rich, red loam, and the climate similar to that of California. Johannesburg is 6600 feet above the sea level. We are now enjoying the rainy season, which is called summer. The winters, they tell me, are very dry and dusty, and heavy frosts are frequent. The country hereabouts is as level as a prairie, but New Johannesburg lies in the center of a hilly spot. This ridge is the much-talked-of gold reef, and is wonderfully full of free-milling ore. Dozens of mills are already in operation, and more are being erected. In a few years Johannesburg will be full of such mills, and there will be employment for thousands of men."

"The reef is 60 miles in length and runs north and south. Only the outcroppings have been worked so far, but arrangements are being perfected to work the lower levels, where the ore is said to run much richer. Each claim is 400 feet square. Those located on the outcroppings of the reefs are fast being worked out, owing to the dip of the reefs, so that owners of claims on the deeper levels will have to work under the greater expense. I understand that the majority of the mining claims and mills are owned by the Rothschilds; but be that as it may, there will be plenty of work for the poor man in the future. Just think of it! A city of 60,000 inhabitants, of which one-half are whites, formed in six years, and a very fine city at that. The blacks are industrious fellows, too, and do all the common labor at from \$15 to \$20 per month. The much-talked-of war is over for the present. The scene of action is about 600 miles from here, so that news reaches us very slowly. The impression prevails that just as soon as the dry season sets in and the floods subside the head chief will be on the warpath again."

"With the advent of the dry season there will be a grand rush for Matabeleland, which is reputed to be the richest gold district of South Africa. It is said to be a dangerous trip on account of the fever in the lowlands, through which one must pass in order to reach the promised land. The charter company is attempting to get control of the entire district, and already lays claim to one-half of all mineral found there. The Government backs it up, and is making it warm for prospectors and locators."

"In this city good board can be obtained for \$7 per week. The bill of fare includes plenty of beef and mutton, but very few vegetables. The Boers are too lazy to raise vegetables, and the result is that potatoes are worth from \$4.50 to \$5 per cental. Ham costs from 60 to 75 cents per pound, and eggs 60 cents per dozen."

In 1842 the British customs tariff numbered 1200 articles. Now it contains but 19, the principal of which are tobacco, tea and liquor.

A Field for Young Men.

John B. Tregloan, in Midwinter Fair Edition of the *Amador Record*.

In choosing one from several topics that had occurred to me, I tried to bear in mind two points—first, what would be of the greatest interest to those who may read this article, and, secondly, to confine myself to a topic that would promote and do its humble part in making Amador county a great mining district—great in the degree that the Comstock mines of Virginia City were great, and akin to the gold fields of Africa. Gold mining, as an industry, and more especially deep or quartz mining, is in its infancy—as markedly so in this county as in any locality in the United States, and probably in the world.

For a distance of 12 miles along the mother lode, from the Empire and Pacific at Plymouth to the Kennedy near Jackson, there are between 40 and 50 properties. Of these but eight have gone below the 1000-foot level. Six or seven have reached the 900-foot level, two or three to the 700-foot level, while the remainder have been untouched and remain to-day virgin properties. Of the four mines opened up below the 1000-foot level, every one has yielded its millions, and two of which are doing so to-day. To the east and west of these different locations there are several claims, perhaps twice as many in all. So much for the field to work in, and now a word as to the outlook for new properties being opened and developed.

Each day brings its quota of mining men to the county. Many of them are looking for good investments for themselves, while others are acting as agents for companies and individuals. Properties are being bonded right along, prospecting is being pushed ahead and new veins are being discovered. The mines throughout the county are yielding over \$100,000 per month in free gold, not counting the amount realized from sulphurets. The resources are such that this could be doubled if the ore were hoisted to the surface and milled, which, unfortunately, is hindered by the lack of necessary equipment. Amador county has a future that will cast a shadow over any other county in the State within the next five years. The great need up to the present time has been "capital and courage" to make the necessary developments, and, I am pleased to note, the fact is becoming well known. Interested parties are now aware that the hills and valleys along the mother lode contain fortunes for those who will seek them. We have seen what the county has done, as well as what it is doing, and we flatter ourselves on the bright outlook of the future.

Mining is becoming more and more of a science, and yet the methods of working are becoming simpler. Improvements are constantly being made in appliances, and progressive mining men are constantly on the lookout for improved methods of saving the gold from the ore. Mining is a broad field for young men to distinguish themselves in. If they are intelligent and observant, and possess any mechanical genius, they can find many avenues in mining in which to profitably train their abilities. Every mine should have an assayer; photography is going to enter into the work, for the peculiar mineral formations and changes must be preserved through this agency for future reference and study; then there must be a surveyor and bookkeeper, and the future mining superintendent will have to be qualified, to a greater or less degree, in all these branches. The young mining engineer should find his post-graduate work in a mine, and not in an office where only theoretical views can be obtained. In this way he can qualify himself to take the place which must soon be relinquished by an older person. No position requires greater executive and practical ability than the successful superintendency of a gold mine, and none is more honorable.

IT IS TELEGRAPHED from Washington that Senator Carey is encouraged over the prospects of the passage of the bill for the cession of 1,000,000 acres to each arid land State and Territory, to be improved by irrigation. The general expression of opinion by members is in favor of the bill, and there is little doubt it will be favorably reported soon by the Committee on Public Lands. Mr. Carey believes the bill will receive the unanimous endorsement of the committee. Senators Dolph and Vilas favor the bill, and say it provides for an experiment in the right direction and may lead to the solution of the question, "What shall be done to reclaim the arid lands?" The far Eastern people probably will favor the idea, as they seem to be possessed of a constant fear that Uncle Sam will spend something himself in improving these lands. Rather than do this, they prefer that he should give them away. But it is quite a question whether the sons of these Eastern men, when they desire farms in the West in the next century, will think their ancestors were so wise to let all these lands go to private ownership to which they must pay rewards for holding. The Eastern person does not understand the West, nor does he seem to be making any progress in that direction.

The Pyritic Smelting Process.

IN TWO PARTS—PART II.

By Philip Argall, E. M., in *Engineering Magazine*.

Another familiar example is the burning of pyrite in kilns for the manufacture of sulphuric acid from the gases given off. In these kilns the pyrite is burnt at a cherry-red heat at the rate of about 40 pounds per square foot of grate area, or say 50 square feet of grate area per ton of ore burnt per day. A modern pyritic-smelting furnace would easily consume 100 tons of pyrites per day in the same area. Now, as temperature is, within certain limits, directly proportional to the amount of fuel consumed on a given area in a given time, one will readily see, by analogy, the enormous temperature that can be produced by the oxidation of pyrite in such quantities. In this way, the possibility of pyritic smelting becomes manifest even to the uninitiated.

From an examination of the available literature of the subject I am led to the conclusion that the inception of smelting pyrite by its own combustion came long after Bessemer's invention for the direct manufacture of steel, by means of blowing air, divided into numerous jets, through a bath of molten cast iron, thus effecting the rapid oxidation, or combustion, of carbon, silicon, and certain other substances present in pig iron. In this process it is obvious that the high temperature developed in the converter is the result of the intimate contact between the air and various oxidizable bodies present. To substitute a molten copper-iron matte in the converter for the cast iron, and to oxidize the iron and sulphur of the matte, producing "black copper" in one operation would appear to be a natural development of the Bessemer idea, and one that, at the first glance, appears to be very easily carried out. Nevertheless, the first experiments in this direction, made in Russia in 1867, resulted in complete failure, as did also the attempts of Mr. John Hollway to smelt pyrite in a modified Bessemer converter, in England, in 1879. M. Pierre Manhes, however, in 1881, succeeded in the bessemerizing of copper matte, overcoming the difficulties of the earlier experimenters, and established his process on a working basis in France. This Manhes process, with various modifications and improvements, is now extensively used in this country for the treatment of copper mattes—of low contents in precious metals. I look upon the Manhes process as pyritic smelting carried to a conclusion by the more or less complete oxidation of the iron and sulphur, and the production of almost pure copper (98 to 99 per cent fine) from the ordinary copper matte.

Returning to pyritic smelting proper, the experiments of Hollway proved that it was possible to smelt pyrite by means of the heat developed through its own combustion. But many obstacles and difficulties were encountered, some of which proved insurmountable, and in consequence of which continuous smelting could not be carried out in the apparatus then used. And while the experiments excited much interest at the time, it was generally conceded that as a commercial system of ore reduction the whole process was a failure.

Mr. W. L. Austin, of Denver, for some years past has given this subject of pyritic smelting much thought and attention, subjecting his methods to careful and thorough tests on a working scale, until he has succeeded finally in overcoming the difficulties encountered by the earlier workers in this field, and, with the aid of the most modern improvements in metallurgy, has built up a system of pyritic smelting that has taken firm root in Colorado, and has become a great industry in the land.

The furnaces used in carrying out the Austin system of pyritic smelting closely resemble the blast furnace used in lead smelting; differing, however, in some essential particulars which are necessary to fit it for the use of the sulphides as fuel instead of the carbonaceous material employed in the lead furnace. The capacity of the pyritic furnace is, however, from 30 to 50 per cent greater than that of a lead-smelting furnace of the same dimensions. This may be partly explained by the fact that in the former the ore and fuel are united in the one substance, *pyrite*; consequently no space is occupied with coke, nor is any time wasted in burning this bulky material.

The *modus operandi* of a pyritic furnace consists in feeding the raw ores and fluxes in pieces as large as can be conveniently handled—and, of course, of the proper composition to form the desired slag—and drawing off the products of the smelting operation, matte and slag, either continuously, as in the case of large furnaces, or at regular intervals in the case of smaller ones. The matte resulting from the first smelting is usually put through the furnace again, together with rich silicious ores. This matte is, if anything, a better fuel than the raw pyrite, and by this second process it is concentrated to a very high value in precious metals, and is then shipped to the refiners. It is, of course, understood that the raw, unroasted pyritic ores

are used in the pyritic smelting furnace, while in other smelting processes such ores must be calcined—often at great expense—before they can be smelted. In the pyritic process, then, the ores are, as it were, roasted and smelted in one operation, at a cost very little in excess of roasting the ores by hand labor.

A word explanatory of the theory of this interesting system of smelting may be permissible. As the pyrite, FeS_2 , descends the shaft of the furnace, one atom of the sulphur is expelled when the zone of dull-red heat is reached. This atom, on meeting the air at the surface of the charge, burns, with the characteristic sulphur flame, to sulphurous acid, SO_2 . The pyrite, then, deprived of its extra atom of sulphur, reaches the zone of fusion as mono-sulphide of iron, FeS , and here it is immediately oxidized by the highly-heated air blast to ferrous oxide and sulphurous acid. The former, combining with the silica, forms a slag of ferrous silicate, while the latter ascends the stack with the other gases. As there is always more or less mono-sulphide present than can be oxidized by the blast, the sulphur runs down in the form of iron matte, which contains practically all the precious metals carried in the furnace charge. If the furnace is worked with a closed top, sulphuric acid may be manufactured as a by-product from the gases evolved from the smelting operation.

In lead or copper smelting, ores rich in these metals are smelted for a moderate price per ton, while the ores that require the addition of lead or copper to the furnace charge, in order to beneficiate them, are naturally subject to a much higher rate for treatment. The supply of such ores in Colorado has been for some time in excess of the available quantity of lead and copper ores necessary to treat them. Leadville, for example, for many years the center of the lead-smelting industry, and even now the greatest producer of lead-fluxing ores in this country, did not yield sufficient lead last year to treat more than one-half her own output. It would therefore appear that there is a good opening in Colorado for a smelting system that can reduce "dry" ores without lead or copper, or with but little copper. Such a system is found in pyritic smelting, by which the precious metals are reduced from their ores by means of the very common, cheap but nevertheless useful metal, iron.

Pyritic smelting is not only applicable to the reduction of the ores of the precious metals, but it can also be applied to the treatment of miccoliferous pyrrhotite, or cupreous pyrite. The raw ores in each case would be fed direct to the furnaces together with the necessary fluxes, the resulting matte could be drawn off into converters and blown until the desired concentration is reached. The whole process of making black copper from the ores should not, under favorable conditions, and conducted on a large scale, exceed \$2.50 to \$3 per ton of ore treated.

Pyritic smelting is comparatively new in Colorado. It is just two years since it was introduced at the La Plata smelter at Leadville, yet we find two works running under the system last year, treating, according to the published statements, over 55,000 tons of ore, producing therefrom 494 tons of copper, 6165 ounces of gold, and 1,224,026 ounces of silver. The product of these works is, as we have seen, an iron matte containing some copper. Now, as the iron in the matte is of little commercial value, it is not estimated in the yearly statement. Taking the copper for comparison, however, we find that, for each dollar's worth of this metal produced, over \$11 worth of precious metals were collected from the ores, against $6\frac{1}{2}$ to 1 in the typical lead-smelting example given herein.

A process that can obtain such remarkable results within two years of its introduction into a State that holds the proud distinction of leading the world in the metallurgy of the precious metals, shows at once its great metallurgical value as well as its economic importance. And it augurs well for its successful introduction into other countries less highly favored with smelting works than Colorado, but which have more extensive deposits of available metallurgical fuel in the form of pyrite. This ore occurs in almost every mineral vein, is more or less abundant in every country, and is now through this process rendered valuable, both as fuel and as a vehicle for smelting and collecting the precious metals from their ores.

THE Bakersfield, Kern county, *Standard* says: There are many persons here who propose to go to the gold fields in the desert when the time arrives that work can be pursued to advantage. We do not believe that persons out of employment can do better than go. There is no doubt that an industrious man can make some money there, a little certainly, if not a good deal. Might not something in the way of gold-hunting be done nearer home? We are told by old residents that many years ago, before gold-digging in the State was generally abandoned for other fields of endeavor, that much placer mining was done along the end of Kern river, from the old overland stage crossing upward. At that time, along the edge of the river, a pair of miners

industriously operating a rocker on gravel taken from the banks was a sight of frequent occurrence, and it should be remembered that an ounce of gold dust is worth as much as four were then. If there are any old miners here we hope they will investigate a little before going farther hundred men might work along the river from the stage crossing to the canyon, with rockers, without raising a debris question, provided gold in paying quantities were found.

Limestone Made Into Marble.

Various modes of coloring limestones have been developed, but the latest that has come under our notice is described in a recent number of *Engineering* as follows:

Marble is a natural product, so that this title is perhaps inadmissible; but works have just been started at Chelsea in which the natural process is so closely imitated by chemical means that there is produced so near an approximation to marble as almost to justify the name. Nature's process is hastened, and is more directly under control, so that although the veining may be varied as art demands, there can be a large production of a uniform tint of stone if desired. The process known as the Moreau-Rae is simple; and by it all limestones or chalk may be converted into the semblance of marble of any tint or combination of shades, while the specific gravity is increased 25 per cent. With limestone, carving or turning is more easily done than with marble. The first process thereafter is to prepare for veining. On the surface of water there is sprinkled a varnish composed of sesquioxide of iron, gum thus and turpentine; and water being unstable, a freedom of design is obtained, especially when the turpentine is broken up by sprinkling of soap. The stone is dipped on the turpentine and subsequently immersed in baths of metallic solutions. These are of sulphates of iron, copper or zinc, separate or in combinations, the specific gravity varying from 1.2 to 1.5. They may be termed the primary colors, and variety of shade is got by different periods of immersion or in varying the order of tanks used. The varnish prevents the sulphates affecting the stone at those points, according to the density of the varnish.

In the case of some French stones where there is a good deal of shell or flint, this process of artificial veining is not necessary, as the same result is got from the existence of shell, and this Marseilles stone has been made into very effective balustrades, as well as fireplaces and table tops. Very dark colors, for instance, are got by using copper and iron sulphates. Zinc and iron alternately give light yellow, while the use of the three in turn gives dark yellow and brown in variegated tints. Black and gold, too, may be got by making the stone yellow before varnishing, after which the black bath is used, so that the veining takes the gold tint. Infinite variety is possible in the manner indicated. After this treatment in the sulphate baths, the stone is immersed in a water bath maintained at 50° Cent. to thoroughly fix the colors, all air meanwhile being expelled; and here it may be stated that the color permeates the full thickness of the stone, as is shown by blocks cut into several thicknesses. The process thus far takes only a few minutes, and the stone is then dried in an oven of a temperature of 90° to 100° Cent., remaining probably for 24 hours. It is then immersed for a corresponding period in an indurating bath—in a solution of sulphate of zinc—which does not affect the color, but effectually hardens the stone, closing up the pores, so that when removed it approximates the density and the specific gravity of marble and has all its beauty and wealth of coloring. It is afterward polished in the usual way.

Advance in Explosives.

In the explosive known as nitro-glycerine a most logical advance was made in explosive science, says an exchange. This is the most intense chemical union which can be placed under practical control that is known to the present conceptions of chemical science. What we know as dynamite, ebensite, gelbrite, etc., whatever secrecy their discoverers may claim for the two latter and others not mentioned, these are virtually dilutions of the first mentioned, the nitric element being the potent element in all of them. In the case of dynamite, it is not necessary to start with the highest grade of explosives; and the introduction of foreign ingredients, in the process of dilution, even then is carried to beyond 75 per cent. This is to insure greater safety in handling, and the substance still possesses all the force necessary to overcome the resistance against which it is intended to act. But let us now consider this simple but amazing combination known as nitro-glycerine. Glycerine is a sweetish substance that forms the basis of fatty matter. The liquid is transparent, without color or smell, and of the consistency of a thinish syrup. This is not even necessary, as a most terrific grade of explosive can be secured by substituting common lard oil. The

basis of nitric acid is oxygen and nitrogen, five equivalents of the former to one of the latter. Oxygen is the vital part of the atmosphere and supporter of combustion and has a peculiar property in generating acids. Nitrogen is the principal ingredient—the vehicle—in atmospheric air—a colorless gas, devoid of taste or smell.

Beet Sugar Interest in the United States.

The production of beet sugar is now receiving so much attention in this State that many readers will be profited by a general review of the industry in this country and a descriptive narrative of the ways and means employed. Dr. H. W. Wiley, who is at the head of the Division of Chemistry of the Department of Agriculture and has immediate charge of the sugar experiments and investigations made by the Government, has the following admirable article, of the scope indicated above, in the April issue of the *Engineering Magazine*:

The beet-sugar industry in the United States is in its infancy, there being only seven manufactories of this product in operation in this country. The oldest of these, at Alvarado, California, was erected about 15 years ago, and has been operated every year since. The factories next in order in seniority are those at Grand Island, Nebraska, and Watsonville, California. Still younger than these, by one year, are the factories at Norfolk, Nebraska; Lehigh, Utah; and Chino, California. The youngest and smallest of the factories, located at Staunton, Virginia, has been operated only one season. The increase in the rate of beet-sugar production in the United States during the past few years is shown as follows:

	Pounds.
In 1887.....	600,000
In 1888.....	4,000,000
In 1889.....	6,000,000
In 1890.....	8,000,000
In 1891.....	12,004,838
In 1892.....	27,083,288
In 1893.....	43,648,797

The next table gives the production, during 1893, at the different factories, as follows:

	Pounds.
Staunton, Virginia.....	36,458
Grand Island, Nebraska.....	1,835,900
Lehigh, Utah.....	3,750,000
Norfolk, Nebraska.....	4,000,000
Alvarado, California.....	4,486,572
Watsonville, California.....	14,500,000
Chino, California.....	15,036,867

The amount of capital invested in the seven beet-sugar factories is about \$2,000,000. Tributary to these factories, under cultivation in beets, are about 20,000 acres of land. The value of this land has greatly increased since it has been used for beet-growing, especially near Chino, California, where the price per acre has become very high, as much as \$200 having been paid in some cases. The cost of cultivating this land in beets is considerably more than \$500,000 a year. The production of beet roots for sugar-making purposes in the United States during the past year approximated 200,000 tons, and the average price paid to the farmers for this raw material was \$4.50 per ton.

It will be seen that a large investment of capital in land and machinery and a large outlay of money for labor are needed to produce a little over 200,000 tons of sugar per year. It is not difficult to foresee the large amount of capital that would be absorbed, the immense amount of labor that would be employed, and the great extent of land that would be placed under cultivation, if even half of the sugar consumed in the United States were made from beets grown within the country. The yearly consumption of sugar in the United States is now approximately 2,000,000 short tons, while the total production of all kinds of sugar—beet-root, cane, maple and sorghum—is about 300,000 short tons, showing that a little less than one-sixth of the total amount consumed is produced at home.

The manufacture of beet sugar in this country is a matter for serious consideration. By reason of the restricted area suitable for the cultivation of sugar cane, it is not to be expected that, under the most favorable conditions, the production of cane sugar in Louisiana, Texas and Florida will ever largely exceed 1,000,000 tons. On the other hand, there are no limits to the possible amount of beet sugar which can be manufactured.

BET FARMING IS HIGH-CLASS WORK.

The production of sugar beets is of itself an art. The ordinary forms of agriculture cannot be used for this purpose. Sugar-beet culture is in every sense intensive, and not extensive, farming. High-priced lands can be used for sugar-beet culture on which it would be impossible to grow profitably the staple crops. Intensive culture, high fertilization, and scientific care in every respect characterize successful beet-sugar culture the world over. The sugar beet requires a deep mellow soil, perfect tilth, entire freedom from weeds and grass, and a great deal of hand-culture. The sugar beet absorbs large quantities of water in its growth; it is fond of potash and phosphoric acid, and is not averse to nitrogen. It is a crop which should not be grown more than once in four years upon the same field, and this field, by judicious rotation and fertilization, is brought during this time into perfect condition again for the production of a maximum crop of beets. The establishment of beet-sugar culture in a community gives an object-lesson in the highest art of agriculture. It acts reflectively upon every other branch of agriculture, so that in countries which grow sugar beets there are better crops of wheat and maize, of barley and hay; there are better classes of live stock, finer horses and cattle, and in general the whole tone and character of agriculture are elevated by reason of the influence, direct and reflexive, of the culture of the sugar beet.

The sugar beet has been brought to its present state of efficiency by the application of scientific principles of

culture in the production of seed. The mother beets selected for seed the previous year are chosen on account of their perfect form and size. They are preserved during the winter in silos. In the early spring they are removed and a diagonal core taken from each one is analyzed. The beets are in this way separated into grades; those showing above a certain percentage of sugar forming the *elite* or first grade, those falling within another class the second grade, with a third class lower, while all those which fall below the standard fixed for the lowest grade are rejected. Little has been done in this country in the way of the production of beet seed, but for three years the United States Department of Agriculture has grown the highest-grade seeds at its station at Schuyler, Nebraska, in accordance with the principles set forth above. The careful experiments undertaken by the Department at this station at Schuyler have shown that beets quite equal to the best grown in Europe are easily produced in the United States.

HOW THE BEETS ARE HANDLED.

The sugar beets, which mature in September or October, are carefully harvested, and the foliage, with a portion of the neck of the beets, removed by a knife. Each beet must be handled separately for this purpose. A portion of the top of the beet is removed because that portion contains a large percentage of the salts found in the beet. These salts—chiefly potash—exert a very injurious effect upon the sugar juices during the process of manufacture. They are bitter; they unite with any oil which the beet may contain and form soap, and they prevent large quantities of sugar from crystallizing.

The sugar beet, having been brought to the factory prepared as above, is passed through a long trough by means of a screw, through which water flows in the opposite direction from the movement of the beets. The beets are thus thoroughly cleaned, all fragments of soil and pebbles being detached therefrom. Thorough washing is highly important, since the presence of sand, or soil, or grit of any kind upon the beets when they reach the cutting machine rapidly dulls the knives and produces bruised and imperfect cuttings. The beets, having been washed, are elevated to a cutter immediately over the diffusion battery. This cutter is a horizontal disk, carrying several corrugated knives. These knives slice the beets, usually into V-shaped pieces, so that, when placed in a trunk, water may freely circulate among them.

The beet cuttings, called "cosettes" or "schnitzel," are next conducted to the diffusion battery—a piece of apparatus designed for the extraction of sugar by means of the osmosis of the sugar juices with the water which is brought into contact with the beet cuttings. The diffusion battery consists of from 12 to 14 cells so arranged that a liquor can be passed at will from one to the other and drawn off from any one of them at any time. The hot water which is used for the extraction passes from one cell to another, becoming more and more charged with sugar juices. When it has passed through a sufficient number of cells—usually 10 to 14, according to the size of the battery—it reaches finally the cell last filled with beet cuttings, and from this it is drawn off into a measuring tank. When the battery is once filled its operation is continuous, one cell being filled with cuttings and the exhausted cuttings being discharged from another every time a portion of juice is drawn into the measuring tank. The exhausted pulp is passed through a press by means of which a large portion of the water is forced therefrom, and the residue makes a most excellent food for cattle. This ration, however, is not a well-balanced one, and certain nitrogenous and fatty bodies are mixed with it in order to make a perfect food. Oil cakes are very suitable for mixing with exhausted pulp for this purpose.

The sugar juices, withdrawn from the battery as above mentioned, are passed into large tanks, where they are saturated with lime, from one to three pounds of which are used for each hundred pounds of juices. The temperature of the mixture is then raised gradually, and meanwhile a stream of carbonic acid is blown through the mixture. By this treatment the lime is precipitated as carbonate of lime, carrying down with it a large portion of the impurities originally contained in the beets. Beet juices, when first extracted, are usually of a dark, almost inky color. After treatment with lime and carbon dioxide in the manner above described, they are usually perfectly brilliant and of a beautiful amber tint. After the lime is all precipitated the juices are passed through filter-presses, on the cloths of which the lime and impurities are retained while the bright juices run through. A second treatment with lime and carbon dioxide is uniformly employed, and sometimes a third, in order to secure sugar juices of high purity. The carbon dioxide used for this purpose is derived from a lime-kiln in connection with the factory, which also furnishes the lime necessary for the precipitation of the impurities.

The purified juices, treated as above described, are next conducted to a multiple-effect evaporating apparatus. Here the juices are concentrated to syrup, the vapors from one of the multiple effects being used to boil the liquor in the second, and the vapor from the second being used to boil the liquor in the third. When this apparatus has two pans, it is called a double effect; when three, triple; they rarely contain more than four, while three is usually the number found.

The syrups, treated as above, if only raw sugar is to be made, are carried directly to the vacuum-strike pan. Small quantities of syrup are first taken into the pan and reduced to the crystallizing point. When fine crystals of sugar appear, additional portions of the syrup are drawn into the pan, continuously or from time to time, and the small microscopic crystals first formed begin to grow to the required size. The operation usually requires from three to sixteen hours, according as the pan is a quick or slow-boiling one.

The sugar thus crystallized during the process of boiling is removed from the pan into a mixing apparatus, where it is thoroughly mixed by means of revolving arms. It passes then directly into the centrifugal apparatus, which, having perforated sides and revolving with great rapidity, quickly removes the molasses from the crystals, leaving

the latter in a very dry form and suitable for transmission to the refinery.

In some beet-sugar factories the refining is done during the process of manufacture. In this case the syrups, before concentration, are filtered through bone-black or saturated with sulphurous acid. By these methods a pure white crystal of sugar is obtained, which, on being dried in a granulating apparatus after coming from the centrifugal, forms granulated sugar.

The molasses which is obtained by the above process is reboiled, and a second crop of crystals obtained therefrom. The molasses from this second crop of crystals is reboiled, placed in tanks, and left to stand for five, six or even eight months, at the end of which time another crop of crystals, dark and mushy, has been formed, which can be separated by the centrifugals in the usual way. The final molasses, which contains a considerable quantity of sugar, is used either for distilling purposes, for fertilizing purposes, on account of the large amount of potash which it contains, or it may be subjected to treatment with freshly burnt and ground lime, at a low temperature, in which way the sugar which it contains is precipitated as sucrose of lime, from which the other impurities can be separated. The sucrose of lime can afterward be beaten up with water into a paste and the lime precipitated with carbon dioxide as above described for purifying the juices. In this way almost all the sugar which was present in the molasses can be recovered.

The manufacture of sugar is a continuous process, *i. e.*, the operations go on day and night. It is probably 24 or 48 hours from the time the beets enter the factory before the crystals of sugar secured therefrom appear, and the process is of such a nature that it cannot be broken except, usually at the end of a week or two weeks, when the house is shut down for repairs or renovation. An ordinary beet-sugar factory has a capacity for the consumption of about 250 tons of beets per day, and should make from 200 to 240 pounds of sugar per ton. In Europe, larger factories are very common, capable of working from 400 to 600 tons of beets per day. In central factories there is a large number of diffusion batteries situated at different points, in which the juices are extracted. From these different places the juices are delivered to the central factory by means of pipe-lines, usually laid under ground. A central factory of this kind will be found able to take care of the juices from 1000 tons of beets per day.

Every one who desires to see the prosperity of American machinery, American ingenuity and American agriculture should favor the development of the beet-sugar industry. There is no other way in which the plethora of agricultural products can be so readily relieved and renewed prosperity brought to our agricultural interests, thus stimulating every other interest in the land. The total consumption of sugar in the civilized world is not far from 7,000,000 tons, of which the United States uses two-sevenths. Of the 7,000,000 tons, over 4,000,000 are made from sugar-beets. It is thus seen that in the race for the markets of the world the sugar-beet is already ahead of its most dangerous rival, the tropical sugar-cane. There is room, however, for both these sugar-producing plants, and there is reason to believe that, with favorable conditions, a great indigenous sugar industry, including cane and beet sugar, can be established in the United States.

African Diamonds.

The African diamond fields are in the Orange Free State, where there is one important mine at Jagersfontein, and in the British colony of Griqua Land West, where there are four, says the *Scientific American*. Of these, the best known are the Kimberley mine and the De Beers, the latter of which was so admirably illustrated in last summer's Columbian Exhibition.

It is but 25 years since the gems were discovered on the Dark Continent, and the value of the annual yield now exceeds \$20,000,000. It is interesting to note that notwithstanding these large quantities are mined and that diamonds have been so successfully imitated, their value has not declined more than a dollar a carat.

The South African mines have yielded larger stones than any found in Brazil or India. Some of them are of a yellow tint, and therefore of low value; but the De Beers diamond (428½ carats) and the Jagersfontein (969½ carats), the last found less than a year ago, are perfectly white. These weights are for the rough diamonds, but the Kohinoor weighed only 192 carats, and was reduced by cutting to 102½ carats.

The Kimberly mine has been worked to a depth of 400 feet, and vertical shafts have now superseded the inclined ones formerly used as means of entrance.

The quantity and value of the African gems in the market have made great changes in the diamond trade. The Brazilian gravels are now worked very little, as are the fields in India and Borneo. London is the diamond market of the world.

Warns Against Fire Damp.

A sonorous warner against the appearance of fire damp has been invented by M. Somzee, and was commented upon at the last meeting of the Paris Academy of Sciences, by M. Haton de la Goupilliere, director of the Paris School of Mines. The invention is brought into action by a flame, under pressure of which a tube vibrates and sounds a warning as soon as the fire damp is present in a working, and in the opinion of M. de la Goupilliere the apparatus should be adopted in mining operations and would be found of great service.

Marble Product of California.

J. H. Giles in the Midwinter Fair Edition of the *Amador Record*.

California is not a whit behind her sister States in marble production. Inyo county has a world-wide fame for valuable marbles in large beds. Marble of fine quality, beautifully variegated and susceptible of a high polish, abounds on the Middle Fork of the Feather river in Plumas county. Our neighboring county of El Dorado, where marble quarries were first opened in California at Indian Diggings in 1857, abounds with marble of excellent quality. There are 30 marble beds, more or less, developed, which give promise of becoming valuable quarries. Almost every variety of marble known to the trade may be found here. One of these deposits, at Grizzly Flat, is of pure white, unclouded marble and is of such extent that immense blocks may be quarried; indeed, it is said to be 600 feet in thickness. Within this magnificent marble bed there exists an extensive grotto, consisting of a succession of large rooms, connected by narrow passages, and extending in length, in the aggregate, 700 feet. Some of

worth. It is of the serpentine or verd antique, green-veined marble—a most rarely choice stone. Judging from the outcroppings, the neighborhoods of Mount Echo and Ione will doubtless some day develop new treasures of marble, while near Sutter Creek, on the ranch of James Elkins, Esq., a splendid bed of first-class, darkly veined and clouded marble has been unearthed; it is susceptible of a brilliant polish and in every respect ranks with the best. In several other places up and down Sutter Creek marble interests are developing.

The value of these deposits is at present not great, but in the future it will be immense. To render them of value to their owners, and to inspire others to prospect the country for other valuable beds, two conditions are requisite, viz., an increased demand for the marble and easy and cheap transportation. To increase the demand, let it be known far and wide what we have to sell; let the owners of these beds invite capital to assist in their development, and hold out such inducements that capitalists may see a profitable investment in accepting the invitation. There should be no "dog in the manger" policy pursued here;

Hawaiians at the Fair.

The Midwinter Fair is giving the average visitor the chance to see more outlandish people in a day than he might otherwise behold in the course of his natural life. These distinguished foreigners are variously engaged at the fair, but they are not here for their health; they are on hand to sell something, or a sight of something. This does not, apparently, diminish their popularity, and really they add much to the entertainment features of the fair and something to the educational features as well, for they fetch foreign customs, habits, dress and dwellings as well as can be learned anywhere outside of a school geography.

The engraving on this page shows a portion of the interior of the Hawaiian village, which is supposed to illustrate native life and manners. There are really many curious things displayed, ranging all the way from idols to industries. One of the most interesting parts of the exhibit is the pond and its appurtenances, which are shown in the engraving. In the foreground is a native in a native war canoe, with the peculiar outrigger which prevents the



INTERIOR VIEW OF THE HAWAIIAN VILLAGE AT THE MIDWINTER EXPOSITION.

these chambers are quite lofty, and from their roofs hang numerous stalactites, imparting to them, when illuminated, a bejeweled appearance of transcendent beauty.

Tuolumne county has long been supplying the market with much marble of the pure white, blue-veined and clouded sort, of good quality. Butte county also contributes a liberal quantity of the same general character as Plumas, the beds, like those of the latter county, being situated on the banks of the Feather river. In Placer county a vein of black marble of the variegated type, which is extremely rare and of great value, was discovered long ago. Solano county has uncovered, in the hills near the Suisun valley, a vast bed of most peculiar marble. In its crude, unpolished state it resembles rosin, but it is of pure quality, takes a good polish, and is thought by some to be but the outcroppings of a most valuable deposit of the rare and costly Sienna marble.

Last, but not least, our own little Amador is also rich in marble deposits of rare quality and beauty. Near Dayton, many years ago, an extensive quarry of white marble, slightly veined, was opened and was largely drawn upon by San Francisco for building purposes. At Oleta several valuable marble beds exist, and a marble mill between that village and Plymouth is in constant operation during the summer. Good marble beds abound in the neighborhood of Volcano. Near Willow Springs, on the Sacramento road, that enterprising citizen, Dr. Boyson, is now developing a marble quarry which promises to be of great

let the owners and their friends get out marble and send samples everywhere where it will do good.

As to the transportation, that matter is to be greatly assisted in the near future, it is confidently hoped, by the construction and operation of the Ione and Sutter Creek railroad. When this is accomplished, marble works can be constructed here and marble merchandise, equal to any and superior to much of the marble in the market, can be shipped from "Little Amador" to all parts of the world.

FIFTY-DOLLAR GOLD PIECES were never coined by the United States Government; there were, however, private issues of octagonal gold coins of this value in California in 1851, 1852, 1853 and 1855. In 1851-55, also, round fifty-dollar pieces were issued in California. They received their full value when deposited at the United States assay offices. By the now-existing laws of this country there can be no revival of private coinages bearing such close resemblance to authorized mint issues.

A HOLLOW celestial globe of copper at Pembroke College, Cambridge, England, was constructed in the last century as a lecture-room, and will hold a half dozen persons or more. The constellations are depicted on its interior, and it rotates on its axis.

MULHALL estimates the number of individuals who emigrated from Europe in 72 years, 1816 to 1888, at 27,205,000. Of these, 15,000,000 came to the United States.

canoe from rolling over. In this pond the native now posing in the canoe is supposed to play with the man-eating shark, when the shark arrives from Honolulu. It is said that this native Hawaiian is absolutely not afraid of sharks, for his father before him prayed to the shark gods that they would always protect his son from these monsters, and his prayer has thus far been answered, for he makes a dive, strikes out toward a great shark, moves around him, plays with him and has complete control of the situation. He is dark and muscular, and wears, when the weather permits, only a malo, or short apron made of grass. The great secret of course, in his skill, lies in his expertness as a swimmer and diver, encouraged, no doubt, by the faith in his father—and the gods. But how a man-eating shark can maintain any appetite for anything after soaking for a while in the Hawaiian village pond, passes our comprehension.

FREDERICK HUDSON says that the first printed newspaper was the *Gazette*, published in Nuremberg in 1457, and thereafter at intervals. In 1534 appeared in the same city the *Neue Zeitung aus Hispanien und Italien*, and at a date between these two appeared the *Cologne Chronicle*. These early newspapers are not contained in any library, so far as Hudson indicates; the earliest printed newspaper in existence is called the *Gazetta* of Venice, is dated 1570, and is represented by a few copies in Venice in the Magliabecchian Library.

Mechanical Progress.

New Machine Guns.

A special to the New York *World* says: Frank M. Garload of this city has finished, after five years' labor, two machine guns of which great things are expected, and he is backed by a syndicate of New Haven and Philadelphia capitalists. Arrangements are being made for a public trial soon near this city. At a private trial a number of army officers and ordnance experts from Washington and Philadelphia were present.

The larger of the two guns is a combination rapid-fire gun. It has three barrels, arranged so that the muzzles form a triangle. The upper one is a one-pounder and the other two half-pounders. The three barrels are cased in a bronze jacket of about 18 inches diameter and 4 feet in length. The mechanism for loading and firing the rifle is concealed in the case and protected from smoke and dirt. The mechanism is operated by means of two cranks, located on the right side of the gun. The one operating the larger barrel is about the center of the jacket; the one that loads and fires the other two is at the breech. Just under the center crank on either side are two hoppers, from which the two half-pounder caliber barrels are fed with ammunition.

The one-pounder barrel is hung on trunnions and tilts. A quarter turn of the crank raises the breech and ejects the empty shell. This is accomplished by means of an oscillating breech-block, constructed so as to lock itself and cock the firing mechanism, which is released by a lanyard.

Connected with the crank which operates the two smaller barrels is a shaft to which is attached two cams, each of which causes a carrier to move forward and backward. The cartridge rolls into the breech from the hopper, forcing the old shell out after it has been started by the outward motion of the carrier, and is forced into the breech by the return motion.

The three barrels can be fired at once or separately at the will of the gunner. The two half-pounder barrels are capable of being fired at the rate of 250 times a minute and the one-pounder 35 times a minute.

The one-pounder projectile is the same as is used in the Hotchkiss, Nordenfeld and other similar guns. Either solid shot or explosive shells may be used. It has an effective range of more than five miles. The gun complete weighs half a ton.

The other machine gun is of small caliber, and weighs only 54 pounds complete and ready for action. It is intended for field service, and can easily be carried by a squad of infantrymen. It is capable of firing a thousand shot a minute. There are four barrels, which shoot a 30-caliber cartridge, after the style of the Lebel. They are surrounded by an aluminum water-jacket. This is the first time this metal has been used in gun construction. The four barrels are operated by a single crank. Cartridges are fed into the barrels on an endless web belt.

Both guns will be taken to Europe soon, where they will be tested by the military authorities of one of the largest powers of the continent.

Long Distance Transmission of Steam.

At a recent meeting of the American Society of Mechanical Engineers, Mr. Eckley B. Cox described a method he had used in carrying steam a long distance. At a colliery they wished to carry steam to a water works about 4500 feet over a hill from the boiler plant. A trough was made by nailing the edges of two boards together, so that they formed a right angle. The trough was supported by two stakes driven in the ground, and crossing just beneath the trough. The pipe was laid in the trough resting in cast-iron plates, the pipes surrounded by mineral wool, and a similar inverted trough placed over the top. To

allow expansion, a bend was made to one side at the top of the bill, and then it was turned back to its original direction. A large receiver was introduced in the pipe at the pumps. This was made of three sheets of an old boiler and was 34 inches in diameter. This also served as a separator. As the elevation was 1800 feet above the sea, the cold was excessive in the winter time, but this arrangement has been in use since 1877, has cost nothing for maintenance, and has given no trouble. Mr. Cox believed that the secret in carrying steam long distances to an engine without causing a drop in the steam pressure was in the use of a receiver or reservoir.—Scientific American.

Smoke Prevention.

Probably people will keep on making a smoke until such time as it is made peculiarly a loss to them by means of penalties; but until then the majority of users of solid fuel will be loth to move in the matter. So long as the fuel bill is kept within a certain limit, people don't care; they argue that they are doing as well as their grandfathers did, and why should they want to make alterations, says Walter J. May.

At one large works in England, the whole of the smoke from a battery of boilers is washed and the ammonia, etc., taken out, the products obtained assisting in paying for the cost of the coal used, besides the working expenses, but the process is not largely adopted because our predecessors did not use it.

By pitting on two regular stokers on a battery of boilers the writer effected a net saving of £3 per fortnight over and above their wages on coal alone, or at the rate of £8 per annum; but because it did not matter about "a little smoke," the management would not continue the arrangement as it was "not the custom to employ firemen," and they still continue to put coal in the furnaces and to send it out of the top of the chimney unburnt. Clever, is it not?

In London the bakers are fined heavily for black smoke, and they do not have any, as a rule; but they find that while such smoke cannot be avoided where there is no penalty, where "40s. and costs" inflicted a few times more than covers the cost of a proper furnace. In some places the Town's Police Act is enforced, and if a chimney catches fire, the occupier of the house is fined. In such places, chimneys rarely catch fire; they are kept swept. But where the act is not enforced, at least 25 per cent of the chimneys in the district get burnt out. Why? Because there is no penalty.

It is no use whatever to advocate smoke abatement in any country until sharp penalties are imposed by an act of the Government and stringently enforced; and when this is done, people will at once arrange their furnaces and other fuel-consuming apparatus so that the fuel will be consumed, but not before.

A New Explosive.

At the Lavaux-sous-Aubonne powder manufactory, in France, some important experiments having been carried out with a view of testing the efficiency of a new explosive which has been invented by M. Raoul Pictet, the well known Swiss chemist. The discovery is the outcome of many years of inquiry into the composition and destructive effect of different kinds of explosives, and as all appeared more or less defective, M. Pictet set himself the task of inventing a new explosive which should be as perfect as possible, and has consequently prepared a compound which he calls "fulgurite." The principal claims for fulgurite are that it is quite smokeless, that the gases, though of greater volume than those of any other explosive, with the exception of fulminic cotton, are not deleterious, and that, while its use is absolutely safe, its destructive effects are quite as great as those of dynamite.—Invention.



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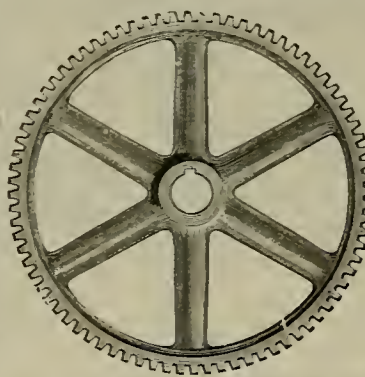
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Scientific Progress.

On Light.

The first lecture of a series which will no doubt prove to be most instructive was delivered by Lord Rayleigh, at the Royal Institution, says the London *Optician*. The subject, "Light, with special reference to the optical discoveries of Newton," was appropriately introduced by a discussion of methods of photometry. It was pointed out that the fundamental "inverse square" law on which the action of so many photometers is based has an obvious foundation quite independent of the particular theory under which the phenomena of light may be accounted for. But if there be, thus, a firm theoretical foundation for the law itself, the same thing cannot be said for its interpretations in the measurement of light-intensity by processes involving chemical change. Stress was put by the lecturer upon the recent elucidation of this unsuspected fact by Captain Abney, who, at one time, probably in common with all other English physicists who had given attention to the matter, professed his almost unqualified adhesion to that view which, as we now know, implies a failure to discriminate between the different ratios of thermal to chemical action proper to different intensities of absorbed light. Lord Rayleigh expressed the opinion that it would not be an unreasonable inference from Captain Abney's photographic discovery to assume a like departure from the true interpretation of feeble light-action in the retina of the eye. It is also possible by converse reasoning on Allard's investigation of interrupted vision to arrive at the same result. In this connection, by the way, a very interesting remark was made by Lord Rayleigh, that in playing tennis the approach of evening, and consequent deficiency of light for seeing, makes itself felt sooner than in almost any other way.

Our readers will be acquainted with the various propositions that have been advanced as to establishing a standard unit of light. Lord Rayleigh pointed out that, of course, the most desirable standard would be based upon the unit of energy. The difficulty which is felt relates to the question of refrangibility. We may mention that it was noted by us how enormously the visual effect of light, expressed as a definite quantity of work, varies according to the length or frequency of the waves. Remarking on this fact—the total distinctness of different colors in their relationship to the visual mechanism in the eye—attention was directed by the lecturer to the additional fact that, in making comparisons of colors, what is called equality in visual intensity with respect to different hues can be attained by optical adjustments which, under similar conditions, exhibit remarkable uniformity among themselves. He suggested, as probably worth studying in this connection, exact measurements of the automatic variations of the iris aperture. Of course there is no immediately obvious reason why the physiological action controlling the area of the pupil should not be just as uniformly responsive to change of lighting as is that retinal change by which the sense of vision is excited. There is perhaps more friction and inertia to be overcome in moving the iris muscles than in effecting any alteration in the condition of the retinal surface. And the pupil, regarded as something alterable by exposure to light, would probably exhibit Allard's relative unresponsiveness by pulsating light upon what may be called a very much rougher scale than that obtaining with respect to the retina itself. But still, no matter how coarse it may be, relatively speaking, the varying diameter of the iris affords a highly interesting measure of light. There are optical methods by which the diameter of the iris could be measured, although not so accurately that a scale of gradation at all approaching to the range of

that which vision affords could be marked out. And Lord Rayleigh supposes, if we understand rightly, that the possibility of regarding certain shades of distinct colors as visually of equal brightness depends in some way upon the photometric capacity of the iris muscles. At any rate the varying aperture of the iris is an important factor which must never be lost sight of in visual photometry.

Another point referred to by the lecturer is that, as exemplified by Schumann's researches, aerial absorptiveness makes itself felt much more in actinometry than in ordinary visual work. Turning from particular processes of measurement to the general laws involved in every optical phenomenon, it was observed that both reflection and refraction are governed by rules so firmly fixed upon a broad theoretical basis that any experiments to demonstrate their accuracy more fully than has hitherto been done might almost be regarded as useless. The same thing does not by any means hold good with regard to other fundamental laws, as, for instance, Ohm's law in electricity.

Mercurial Soap for Cholera.

According to the *American Architect*, two chemists of Hamburg, MM. Forster and Nijland, have published some studies on the cholera infection, from which it appears that soap is one of the best known sterilizers of water suspected of infection. For a long time after the cholera epidemic of last summer, the people of Hamburg were afraid even to bathe themselves with Elbe water, but MM. Forster and Nijland show that ordinary toilet soap, added at the rate of an ounce to about twelve quarts of water, will kill the cholera bacilli in ten minutes. This would be a large proportion of soap to use in a bath, but as most people, instead of dissolving soap in the bath water, apply it to the skin with a sponge, it is probable that the water actually brought in contact with the skin is generally soapy enough to be harmless. If, however, it is desired to obtain greater security, a soap containing a small quantity of corrosive sublimate may be used. Many "complexion washes" contain this drug, which is said to have a beneficial effect on the skin, however dangerous it may be internally, so that no hesitation need be felt in employing soaps medicated with it, and a very small quantity is sufficient. With a soap containing one per cent of corrosive sublimate, added at the rate of a quarter of an ounce of soap to sixty quarts of water, all the cholera bacilli will be killed in one minute, and half the dose will kill them all in ten minutes; while the sublimate alone is still more active, an ounce being sufficient to destroy, in five minutes, all the cholera microbes in about a million quarts of water.

Where Did the Tails Go?

The apostles of evolution have never satisfactorily accounted for the disappearance of tails among mankind. It is interesting, therefore, to read that Prof. Drummond thinks the end of the vertebral column, consisting of three, four and occasionally five vertebrae, called the coccyx, forms the real rudimentary tail. In the adult this is always concealed beneath the skin, but in the embryo, both in man and apes, in an early stage it is much longer than the limbs. What seems decisive as to its true nature, however, is that even in the embryo of man the muscles for wagging the tail still exist. In the grown up human being those muscles are represented by bands of fibrous tissue, but cases are known where the actual muscles persist through life. That a distinct external tail should not be still found in man may seem to refute the arguments of the evolutionists, but it would have been contrary to the theory of descent had he possessed a longer tail, for all the anthropoids most allied to man have long since

parted with theirs, so the absence of tails is more favorable to the idea of evolution than their presence would have been.

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Electric Progress.

Steering by Telephone in a Fog.

For some time Mr. Charles A. Stevenson has been making experiments for locating the position of vessels at harbor entrances, which would be of service when, during certain states of the weather, other observations cannot be easily made. He proposes, according to the *London Pall Mall Gazette*, that a cable might be laid down in the sea, and, by changing the electric state of the cable, vessels passing near or over it might be able, by means of a detector on board, to discover that they were in its vicinity. Some experiments showed the method to be feasible, since the sea offers no insurmountable difficulty, and he has constructed two instruments which will act through 180 feet of water.

The first instrument is a coil of uninsulated copper wire rope dipping into the water at the bow of the boat and a similar water connection at the stern. If these are joined by a wire with a telephone on the circuit, it will be found that, even without an induction coil or other arrangement to magnify the effect, a very sensitive instrument is produced; and that, when the wires from bow to stern of the boat are at right angles, or nearly so, to a cable laid in the water at some distance from it, the sounds produced by a magneto-electric machine connected to one pole of the machine are audible in the telephone. If the water connections are equidistant from the cable, as they would be if the boat were immediately over the top of it, or lying broadside on, no sound is heard. The action takes place when the coils in the water are insulated. The cable also may be insulated or uninsulated. The action is similar with an induction coil, and will also act if the potential of the cable is charged and is then kept so. With the coils separated 10 feet (at the bow and stern of a small boat put down from the vessel), and an insulated wire 400 feet in length laid through a small lake of brackish water 15 feet deep, the alterations produced by the bobbins of a magneto-electric machine were perfectly distinct at the end of the lake, 340 feet away from the wire, and the limit of audibility could not be ascertained. Further trials will be necessary to determine the law of the falling off of the intensity of sound with the increase of the distance from the cable for a given fixed distance between the water connections, as well as to determine the law of increase intensity for any increase of distance between the bow and stern connections for a given fixed distance from the cable.

Mr. Stevenson's second instrument is a coil of insulated wire surrounding a core—that is, an electro-magnet with a telephone in the circuit of this coil. With this instrument the making and breaking of the current produced through a wire 200 feet in length could be detected through 60 feet of salt water. When sunk in water the sound seems just as loud. He is of opinion that the action of the instrument consists in the break, if broken sufficiently rapidly, inducing a current in the coil, which the core intensifies immensely. The sound in a Bell telephone with the instrument was almost deafening with 15 feet depth of water. This electro-magnet system of induction, in contradistinction to the parallel wire system, has no earth connection, being entirely insulated, and must, therefore, be a case of true induction through water.

Electric Light for the Piano.

A clever design has been brought out for enabling electric lights to be thrown on the musicboard of a piano, even when no street mains are available. The lamps project from the front of the piano, in the usual way, but the portable battery from which the current is derived, a switch, and the necessary electrical connections, are placed

behind the musicboard. This is done by making the musicboard slope at a more pronounced angle, but it does not otherwise interfere with the working of the piano. The whole of the front can be lifted out, including the battery end of the lamps, leaving the interior free for tuning, as usual. A lithanode battery is used, which, once in position, can be securely fastened with lock and key.

Electricity in the Perfumer's Laboratory.

The manufacturers of old and favorite brands of perfumery are just now greatly exercised by the accounts of a new development in Paris. It is stated that a perfumer in that city has recently suddenly acquired a remarkable reputation for the super-excellence of his wares, which exhibit a phenomenal charm and subtlety. What for a time perplexed his fellow perfumers, who were thus distanced in business competition, was the fact that although his sales were much greater than ever before, his purchases of essential oils were much less, both in regard to quantity and variety. The secret is now divulged. The enterprising perfumer had read that ozone was used for the purpose of mitigating the crudities of new wines and spirits, and tempering and softening their flavor, and he thought he would try its effect on perfumes. Fitting up his laboratory with the needful electrical appliances, he set to work and soon found that the odor of essential oils could be surprisingly modified by the action of ozone, and that by the skillful combination of spirits and essences, and their treatment with the ozonizer, he could vary their delicacy or power at will. If this discovery should prove to be trustworthy, a vast field is opened to the perfumer, who will now need but to lay in a stock of alcohol and bergamot to turn out essences of the widest range, from the stimulating fluid that is more pungent than the strongest aromatic vinegar, to the scented drops that intoxicate the senses like the morning air when the orange trees are white with bloom.

Electric Light as a Disinfectant.

Professor H. M. Ward's researches on the influence of light on bacteria have brought out some remarkable facts. Prof. Ward demonstrates conclusively that the naked arc light may be used in hospitals or railway cars most effectively as a disinfectant, by reason of the effect of its rays upon bacteria. He has allowed the various rays of the spectrum to fall on films of gelatine or agar containing spores of bacteria, and finds that whether the spectrum is got from sunlight or electric light, there is no perceptible action on the spores of bacteria by the infra-red, red, orange or yellow rays, while all the spores are injured by the rays of the blue and violet region. Broadly speaking, the injurious action begins at the blue end of the green, attains a maximum in the blue, and diminishes toward the ultra violet. With the electric light, quartz lenses and prisms had to be used in forming the spectrum, as the results with glass were feeble. The injurious influence of the blue rays extended far into the ultra violet. The intervention of a thin piece of glass resulted in cutting off a large proportion of effective rays.

Blocks of Carbon in Lungs.

The lungs of a polisher of electric light carbon terminals were exhibited by M. Lancereaux at a recent meeting of the French Academy of Medicine, and it was shown that the said organ had been transformed into veritable blocks of carbon. Up to the age of 36 the deceased had been a robust stonemason, but was then transferred to a workshop eight metres long by seven broad, where, with eight other men, he was engaged in polishing on stone mills carbons

for electric lighting. The shop was so badly ventilated that sometimes they could not distinguish each other through the stone dust and charcoal filling the atmosphere, and the result was apparent in M. Lancereaux's exhibit, which was a strong argument, if one was needed, for the better ventilation of workrooms and the use of the respirator.

Lamp for Musicians.

An ingenious little lamp has been devised for the use of musicians in an orchestra during a dark change in a theatrical or operatic performance. At the top of each music desk is a cylinder containing two 16-candle power incandescent lamps. The cylinder has a quarter-inch slit along its entire length, and when placed at a certain angle sheds light all over the page of music, while all around it is dark. This is said to be far more effective in every way than the ordinary shade.

Long-Distance Telephony in Spain.

An important long-distance telephone line is being constructed between Madrid and Barcelona, a distance of about 500 miles. The line will pass through Saragossa and is expected to be ready within three months.

Practical Information.

Origin of the Dollar Mark — Five Theories.

Below I give five theories of the origin of the dollar mark (\$), they being selected from about twenty seemingly plausible solutions:

1. That it is a combination of "U. S.," the initials of the United States.
2. That it is a modification of the figure 8, the dollar being formerly called a "piece of eight."
3. That it is derived from a representation of the pillars of Hercules, consisting of two needle-like towers or pillars connected with a scroll. The old Spanish coins marked with the pillar device were frequently referred to as "pillar dollars."
4. That it is a combination of "H. S.," the ancient Roman mark of unit money.
5. That it is a combination of P and S, from peso duro, signifying "hard dollar." In Spanish accounts peso is constructed by writing the S over the P, and placing it after the sum.

According to one writer the symbol of the dollar is a monogram of the letters "V," "S" and "J," the dollar being originally a "thaler," coined in the valley of Sankt Joachim, Bohemia, and known as a "Joachim's thaler," and the monogram the initials of the words, "Valley Sankt Joachim." A writer in giving his opinion of "Reason No. 3," as given above, says:

"The American symbol for dollar is taken from the Spanish dollar, and the origin of the sign, of course, must be looked for in associations of Spanish coins. On the reverse of the Spanish dollar is a representation of the pillars of Hercules, and around each pillar is a scroll with the inscription 'plus ultra.' This device in course of time has degenerated into the sign which at present stands for American as well as Spanish dollars, '\$.' The scroll around the pillars represents the two serpents sent by Jnno to destroy Hercules in his cradle in mythologic lore."—St. Louis Republic.

A Substitute for Linseed Oil.

The *London Engineer* gives the following patented method for preparing a composition oil, possessing the qualities of linseed oil, as a vehicle for paint. The composition consists of crude petroleum, 1 gallon; yellow beeswax, $\frac{1}{4}$ lb. to $\frac{1}{2}$ lb.; powdered resin, $\frac{1}{2}$ lb.; zinc sulphate, $\frac{1}{2}$ lb. to $\frac{1}{4}$ lb.; lead acetate, $\frac{1}{2}$ lb. to $\frac{1}{4}$ lb.; rubber, $\frac{1}{2}$ oz. to 1 oz.; linseed oil, $\frac{1}{2}$ pint to 1 pint. A still, similar to a large steam boiler, with a

dome and manhole, is employed. This still is provided with two sets of coiled tubing inside, one set being perforated for admission of steam. The crude petroleum is first placed in the still, and blown by direct steam for six or eight hours, till the lighter impurities have passed out to a suitable condenser. The lead acetate and zinc sulphate are then added to the petroleum. The contents of the still are heated by sending steam through the coil of closed tubing, till the solution has boiled for an hour. The beeswax, resin and rubber are then added, and the ingredients boiled together for about seven hours. The mixture is then allowed to cool, and the linseed oil added.

Aids to Longevity.

The philosopher may balance the advantages and disadvantages of long life, and may decide in favor of a short time of human existence. But it is clearly a prime part of the business of the physician to make life as long as possible, and as comfortable. There are two sorts of pressure which tend to shorten life—blood pressure within and atmospheric pressure without. This latter is a specially important factor in a humid climate like our own. In advancing age the circulation of the blood and lymph tends to become slow, and the enfeebled heart finds its embarrassments increased by this condition. Especially do the more vascular organs, such as the lungs, the liver and the kidneys, put skids on the wheels of the blood circulation. Plainly, then, an important condition of cardiac easement, and therefore of life prolongation, is the maintenance of an uncongested state of lung, liver and kidney. Thus are internal pressures relieved, and thus is cardiac energy conserved. Of almost equal importance, at any rate in Great Britain, is the question of atmospheric pressure and moisture to aged persons. Situations which are at once low-lying and damp give, of course, a maximum of atmospheric pressure. Such pressure weighs down at a single stroke body, mind and life. The difference to aged persons between living at the sea level and living 500 feet above it, between living in a moist atmosphere and living in a dry one, is sometimes quite incalculable. Not seldom life may be lengthened by five or even ten years by living in an atmosphere which is both light and dry. These physiological considerations are commended to the aged and to the physician of the aged. While physiological explorers are busy in the laboratory, clinicians must not imagine that new discoveries can be applied in practice without constant and intelligent effort on their part. Knowledge, like freedom, "filters slowly down," but there is no objection to a little artificial acceleration of the pace.—Hospital.

Light in Machine Shops.

An observing mechanic has just come to the conclusion that a ray of light can get so badly distorted in a machine shop that no dependence can be placed upon it. If a number of gas jets are used when lighting-up time arrives, the heat about every jet is enough to rarefy the air to such an extent as to form just the medium for bending the rays of light and to deceive every mechanic who may be trying to work up to the mark. If rarefied air is disturbing the rays of light to such an extent that "things are not what they seem," that a straight line appears to be curved a trifle, and everything in general slightly on the move, this observing mechanic can rest assured that something beside the rays of light need looking after. A defect that can be traced to this source would naturally take into account that every piece of machinery is undergoing a change in position wherever this rarefied air comes in contact with them. The man at the lathe is boring out tapered holes just from the effects of expansion due to the heat that is being absorbed by the lathe bed. A me-

chanic that is so fine in his work that ray-hending is a source of trouble should take note of a dozen other defects that are going on around him that are far more notable in this respect.—Boston of Commerce.

Origin of the Locomotive Whistle.

When locomotives were first built, and began to trundle their small loads up and down the newly and rudely constructed railways of England, the country roads were, for the most part, crossed at grade, and the engine driver had no way of giving warning of his approach except by blowing a tin horn. This horn, as may be imagined, was far from being a sufficient warning. One day, in the year 1833, a farmer of Thornton was crossing the railway track on one of the country roads with a great load of eggs and butter. Just as he came out upon the track a train approached. The engine man blew his tin horn lustily, but the farmer did not hear it. Eighty dozens of eggs and fifty pounds of butter were smashed into an indistinguishable, unpleasant mass, and mangled with the kindling wood to which the wagon was reduced. The railway company had to pay the farmer the value of his fifty pounds of butter, his 960 eggs, his horse and his wagon. It was regarded as a very serious matter, and straightway a director of the company, Ashlen Bagster by name, went to Atton Grange, where George Stephenson lived, to see if he could not invent something that would give a warning more likely to be heard. Stephenson went to work, and the next day had a contrivance which, when attached to the engine boiler, and the steam turned on, gave out a shrill, discordant sound. The railway directors, greatly delighted, ordered similar contrivances to be attached to all the locomotives, and from that day to this the voice of the locomotive whistle has never been silent.—Birmingham Daily Post.

A Lightning Calculator.

The new theater of Koster & Bial's, New York, is just now a point of interest to the mathematician.

M. Inaudi, of Paris, astonishes every one by his marvelous feats with figures. With his back to a large stage blackboard he reads off accurately long lists of figures given by the audience and written down by an assistant, the figures apparently becoming photographed on his brain and remembered without effort. When later he is called upon to repeat them, each figure is four different sums was correctly remembered and the problems solved, although M. Inaudi permitted a quarter of an hour to elapse after the writing of the figures on the blackboard before he read them off, devoting himself meanwhile to telling the day of the week on which any one in the audience was born, if they stated the year and day of the month. M. Inaudi explains this interesting feat by saying that one part of his brain goes ahead solving the several problems on the blackboard—the figures of which he has only heard announced once and had never seen—and another part of his queer gray matter attends strictly to the business of telling the members of the audience their birthdays!

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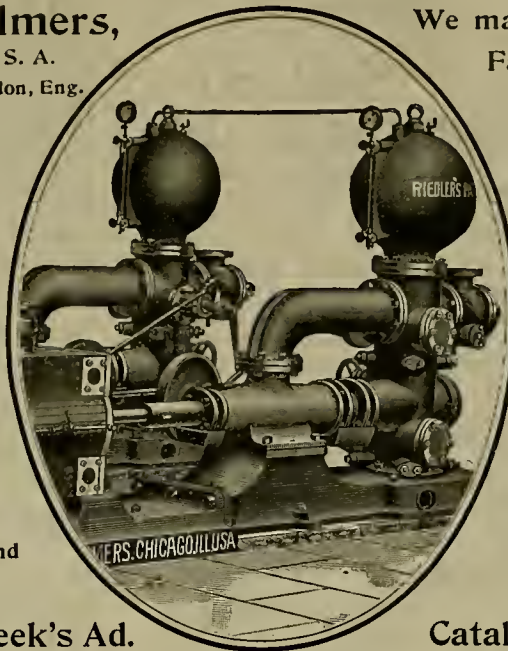
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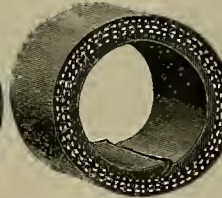
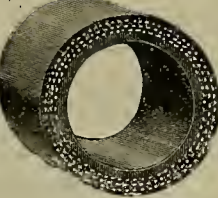
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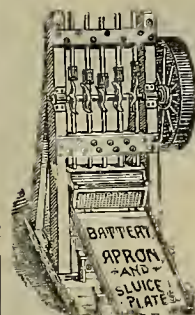
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Gurit has collected figures which show that there is one death to every three thousand administrations of chloroform, while with ether there is only one fatal case in fourteen thousand. Ether is dangerous to the lungs; chloroform to the heart.

The total number of deaths in the United States in 1892 was about 900,000; the number of persons cremated that year, 503. As crematories have been in existence in the United States since 1881, these statistics indicate that the movement favoring the burning of the dead is not making much progress.

Commodore Decatur's first command was the Norfolk, in 1802; later he commanded the Enterprise. In 1804 he commanded the Intrepid in destroying the Philadelphia in the harbor of Tripoli. In September, 1804, he commanded the Constitution and later the Congress, and in 1809 commanded the Chesapeake. In 1810 he took command of the United States, frigate. In 1814 he commanded the President, frigate, which he had to surrender to four British vessels. In 1815 Decatur commanded a squadron in the Mediterranean, and humbled Algiers, Tunis and Tripoli, and returned home in 1816 to become a member of the Board of Navy Commissioners. He never went to sea again, and was killed in a duel March 22, 1820.

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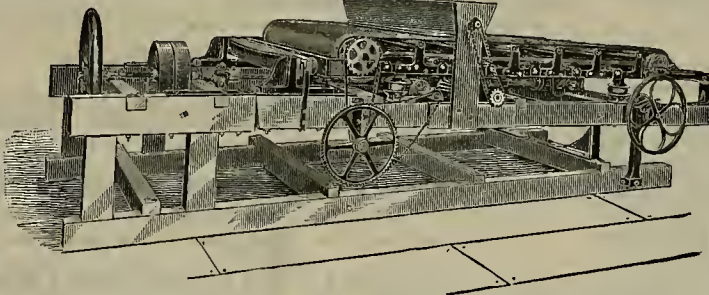
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Mining Summary.

The following is mostly condensed from journals published in the interior, in proximity to the mines mentioned.

CALIFORNIA.

Amador.

RESUMPTION OF WORK.—Ledges: Work was commenced this week on the Matson mine in Butte Basin. There are four men at work there now and as soon as everything is in shape to see more they will be put to work. The work is in charge of H. Ferrel. S. T. Smallfield is in charge of the construction of a hoist to be used by horse power, with one bucket, while others of the employees are engaged in retimbering the old shaft. The present shaft is down about 90 feet, and about 50 feet from the surface a drift runs about 40 feet. On the same claim is a tunnel about 100 feet into the side hill from which rock milling \$5 per ton has been taken. The intention of the present management is to take out four or five hundred tons of rock and have it crushed in the Tripp mill, near Big Bar bridge. If the returns are satisfactory a steam hoist and a mill will be erected during the summer and work continued upon a large scale. Those in charge are certain of the success of the property, as the surface ground in that neighborhood was very rich in gold in early days. Mrs. J. Baptiste conducts a boarding-house on the property at which the men board.

The Argonaut people are sinking in that property as steadily as possible. The shaft is now down 125 feet, and is advancing as rapidly as possible in the hard rock in which they are sinking.

Workmen are engaged at the Kennedy in building an addition to the chlorinating furnace. The work of chlorinating has lagged somewhat of late on account of the small capacity of the furnace and it was found necessary to add about one-third to the capacity of the old one. In a few weeks the extra furnace room will be in operation and a few weeks later the chlorinating works will be up with the mill and can be kept there without taxing its capacity.

Nevada.

IN GOON SPIRITS.—Telegraph: Superintendent Stoddard returned from Sacramento last night, where he has been to attend a stockholders' meeting of the Centennial Mining Company. He informs us that the members of the company are well pleased and in good spirits over the outlook. The 650 level is especially promising, and the company have decided to put in an air compressor and Burleigh drills. With this accomplished, the development work can be pushed ahead with great rapidity, and in a short time hence we may expect to once more see the Centennial upon the list of dividenders as it was in former years.

A VERY GOOD SHOWING.—Union: Although two dividends of 15 cents a share have already been declared this month, Superintendent Mainhart says another will be declared by the Omaha and Lone Jack Company next Tuesday. Last month's run was the best in the history of the mine. The ore being crushed this month shows improvement over that of March, but it may be possible that the cleanup will not be quite as large on account of part of the mill being used on tributaries' rock. A double track will be laid shortly in the Lone Jack, when all the quartz will be hoisted through it instead of the Omaha shaft. The mine is equipped with good machinery and was the first in the district to have all its works lit up by electricity.

The Wisconsin has been leased by several practical miners, who have made such a success of their venture that they have over 30 men hired under them at \$3 per day. The last crushing of 160 loads amounted to nearly \$10,000, and this month's yield, with Southern's and Perrin's mills kept running, will likely exceed that gratifying sum. The ledge varies in size, but will average 18 inches. The principal work is being done in the 300 level, but the shaft is being sunk and drifts will be turned when a depth of 400 feet is attained. The ore in the shaft improves in quality right along and will get better as the country explored by depth becomes more settled.

There is every reason for the fortunate owners of the Electric (formerly known as the Green Mountain) mine to feel enthusiastic. Every assurance is afforded that it will develop into a big property. The ore in the shaft, at a depth of 400 feet, is excellent milling ore, which improves in quality the deeper the mine is worked. The ledge here is from 15 inches to two feet in size, and will doubtless mill \$35 a ton or over. While sinking is in progress the mine is also being opened up by drifts north and south in the 300 level, but not a pound of ore has been stope out. The coming week a station will be cut at the 400 level and drifts turned both ways on the course of the ledge. In another week the new ten-stamp mill, which is a model one in every respect, will be started up, and it is expected that it will continue in motion incessantly. There are 40 or 50 tons of good ore on the dump, and with all the backs in the 300 level to be worked and the 400 level opened up, a good force of men employed will be able to keep it running.

In the Original Empire, during the past week, drifting was commenced on the 2100 level north. Within two months it is expected the pay chute will be reached. Very good ore is being extracted in the 2000 level north; and, while the quartz in the south drift of this level is of fair quality, the main chute has not yet been encountered. It is expected to tap the ore chute in this drift which yielded so handsomely in the 1800 level almost any day.

The South Idaho claim is regarded as very promising. The vein is a parallel one to its famous neighbor and is just the same character of ore. On Friday some ore was taken out

which showed considerable gold, but it is evident that before the real value of the mine can be known, greater depth is necessary.

The Orleans is holding its own in good shape. Ore is being stope in the north and south drifts of the 250 level and sinking is also progressing. The mine is practically paying its way now at a superficial depth, and for it to yield dividends all that is necessary is for the mine to have greater depth and be opened up. The new mill has not yet been commenced, but will be shortly. The ore averages \$30 per ton.

A fair test crushing of ore from the Granite Hill mine has never been made, but in about two weeks Supt. Waggoner expects to have a crushing which will determine the value of the ore. It is promising in appearance and will doubtless mill well. The drifts are being run, and preparations are being made for sinking. Twenty men are employed.

Supt. Bennalack is feeling in better spirits over the prospects of the Central North Star. He informs the writer that the ore is 50 per cent better than at the last report, and the quartz being saved will mill \$25 per ton. The ledge is 18 inches in size. Sinking will be continued for an indefinite time.

Supt. Coffin informs the writer that stock in the Kate Hayes mine is being rapidly taken, and that some time the coming month a plant will be placed on the mine so that work can be commenced.

Polkinghorn & Co., the lessees, are pushing work as fast as possible at the Crown Point. The principal work is being done in the 200-foot level. The ledge is seven feet in size and pitches to the south, contrary to that in the old workings. It is expected, when sufficient depth is attained, that the ledges will make into a valuable pay chute. The ore from the Crown Point contains much sulphurets, and has to be worked by the smelting process. It assays \$51.50 to the ton.

The prediction made some time ago, that the Osborn Hill when developed would be a good mine, is coming true. It is the largest of what might be termed the young mines, by reason of the fact that it was not worked to any extent when work ceased on it years ago, in Grass Valley mining district. Work is being done in the 400 north drift, 500 north and south and 600 north and south. About the end of the coming week, sinking the shaft will be resumed. The ore of the Osborn Hill will average \$36 per ton, and when the new mill is erected ought to prove a bonanza.

Discussing of other adjacent mines the Union says of the W. Y. O. D.: Although no dividends have been declared of late by this mine, it has more than paid expenses. The 600, 700, 800, 1000 and 1100 drifts are being worked right along and the sinking of the shaft is also in progress. In a short time the 1200 station will be cut and drifts run on either side. Air compressors and power drills will be put in the mine at once, so developments can be hastened.

Two weeks ago Superintendent Dalmaine started to erect machinery on the Normandy mine. It was all in place in eight days, and the shaft has been cleaned out to within a few feet of the bottom. The shaft was found to be badly caved and even as expensive to repair it as to sink a new shaft. The Normandy was worked only to a depth of 50 feet, but it yielded many thousands of dollars as far as worked.

Pushing the main drift and raising to strike the ledge is what is being done at the North Banner. Almost every day now the good news is expected that the pay chute has been uncovered. The North Banner has paid a number of dividends and by systematically working it more dividends ought to follow. A company with ample means owns the property and no expense will be spared to open it up.

At the St. John mine no new developments have taken place of late. The 500 drifts are being run and a crosscut in the 300 level. The ledge is large, but the main pay chute has not yet been discovered. It is expected to strike it any time, however. With such a large ledge when pay ore is struck the St. John will be a big property.

The Centennial mine, which in the early days yielded so richly, is making good progress. Drifting north and south on the 650 level is being pushed. The north drift especially is looking remarkably well. At a meeting of the stockholders held in Sacramento during the past week it was determined to develop the mine vigorously, and, to better accomplish the work, men have been put on eight-hour shifts. The company has decided to erect an air compressor and introduce Burleigh drills, and a new 50-horse power boiler has been contracted for.

ENCOURAGING REPORTS.—Nevada City Herald: M. D. Cooley is making good headway in his mine at Quartz Flat, near Washington.

Cole & Williamson are also getting along nicely, and will have a big mine some day. The Centennial Company will resume work on their mine up the Washington Ridge in a few weeks.

The Blue Jay mine, near Maybert, is reported looking splendid.

The big flow of water in the Yuba mine has been overcome, and sinking is progressing rapidly.

San Bernardino.

GLITTERING GOLD.—San Bernardino Index: On Salt creek, four miles east of Elsinore, is a six-foot lead of free-milling ore and sulphurets, with the contact vein between slate and granite. The lead runs in a northwesterly and southeasterly direction. There are a number of locations on it, and five of them are being worked and are showing up well. Returns from assays made of this ore gave \$3 to \$1000. This ledge has been known for many years; but as the cap rock only assayed \$3 in gold, no one had the nerve to open it up. There is not a doubt but that the parties now working there have made a very rich strike. This contact vein has been traced for 18 miles, and runs in

the direction of the place where Chas. Briggs made his big strike, about six miles south of Winchester. By following the contact in a northwesterly direction, it leads past some of the rich strikes of the Gavilan district and on to the old tin mine itself. There is talk of organizing a party to prospect along the contact systematically as far as the desert.

Sierra.

BAD MANAGEMENT ALLEGED.—Downieville Mountain Messenger: We learn that there was an attachment levied on the Mount Moriah mine, at American Hill, this week. Who the attaching parties are and the amount attached for we do not know. This mine has only been running for a little while and the failure is, presumably, the result of bad management, as the mine is known to be rich. Bad management is, and always has been, the bane of this county. Many good mines have been ruined by mismanagement and every one so ruined helps to give the county a blacker name and keep capital away. It should be made a penal offense for a man who knows absolutely nothing about mining to undertake the management of a piece of property.

Siskiyou.

Notas.—Yreka Journal: Preparations are being made to commence work on the Schroeder quartz mine at Deadwood, as the snow is rapidly disappearing to permit hauling of supplies and getting around at the mine, where there are still about three feet of snow. Teamsters will commence hauling wood this week for the summer supply in running the steam engine, and as the road improves, there will be about 20 tons of new machinery and stamps to be taken to the mine, which indicates that the owner has a big thing in the way of valuable gold quartz.

The Cherry Creek, Deadwood Creek, McAdams Creek and Greenhorn Creek miners are all doing a rushing business in ground sluicing, with an abundance of water, which will last a long time, on account of the great amount of snow on the mountain summits, with the ground thoroughly soaked from the extraordinary quantity of rain during the past winter. After the supply gets too light for ground sluicing, there will be sufficient water for a long time to continue washing up the bedrock gravel in the sluice boxes, with good success.

All the hydraulic claims along the banks of of Klamath river for nearly 60 miles, from Seiad and vicinity down to the triangular corner of Siskiyou county bordering on Trinity and Humboldt counties, are being worked energetically with good success. The banks along the river in that section are rich with gold, and the various creeks furnish an abundance of water with heavy fall for operating immense giants in mowing down the steep banks.

The Greenhorn blue-gravel mine, about a mile south of Yreka, is paying exceedingly well at present, about half an ounce a day to the man, with 21 hands employed. Three drifts have been run from the hoisting and pump shaft, and the gold taken out is mostly found on bedrock, of coarse quality, similar to river dust. There is a good supply of water for washing, which is likely to last until very late in the season, if not all summer.

Thos. Ewing, a San Francisco mining capitalist, has secured the interest of Gonzales in the Boyle quartz mine on Humboldt creek, and intends working the same on an extensive scale in company with Mr. Boyle. He has sent here from below a dozen good miners, who left Yreka on Monday last with a wagon load of supplies to commence operations on an extensive scale, with the expectation of taking out considerable gold dust this season.

Newton Lamb has commenced preparations for opening up his placer claim on Greenhorn creek above the blue-gravel mine of Tim Austin & Co., and before long will be engaged in sinking a shaft to bedrock. He intends putting up first-class hoisting and pumping machinery, in order to work the mine with profitable success. The success gained by Austin & Co. and Lamb will no doubt cause the sinking of shafts in various other sections of the Yreka basin.

Trinity.

THE SILVER GRAY SOLD.—Journal: A party of mining men, consisting of B. B. Deming and Mack Weber of Oakland and G. E. Evans of Auburn, arrived on the 8th inst. and put in several days in examining mines on Canon Creek. They are the gentlemen interested in the bond on the Silver Gray, which mine we understand is sold to them, the first payment to be made this month. The mine has been prospected for the past three months under the supervision of Frank Adams and shows up well. The company intend putting a mill on the mine at once, and will work men enough to keep the mill and mine running in good shape. From all indications times around Dedrick will be better this summer than for two years past.

THE LA GRANGE DITCH.—The water is now running through the La Grange Hydraulic Mining Company's ditch to the mine, with the exception of about three miles at the head, where the snow is very deep and there are some slides not yet cleared out. The water was turned through the pipe lines last Monday. The pipes are perfectly tight and there is no leakage. At present about 800 inches of water is delivered at the mine. In two or three days the Coal Creek water will be turned in, increasing the supply by three or four hundred inches. The ditch is in splendid shape. The mine now has a better water supply than ever before.

NEVADA.

Washoe District.

James G. Rule returned to the Comstock yesterday, says the *Enterprise* of the 14th, and expects to remain on the lode until his contract is completed. He is still confident of

developing ore on the 1000 level of the Consolidated California & Virginia in the time specified.

SCOAPION.—The east crosscut from the joint north drift on the 900 level from the Union shaft, started at a point 283 feet south of the station, was advanced 17 feet, making the total length 75 feet; face in porphyry and clay with seams of quartz.

SIERRA NEVADA.—The south lateral drift from the intermediate tunnel has been advanced 30 feet; total length, 603 feet; face in hard porphyry.

The joint east crosscut near north line from the north drift, 1520 feet west of the shaft, 900 level, has been advanced 21 feet; total length, 233 feet; face in clay and porphyry.

UNION SHAFT.—The joint east crosscut near the north line from the north drift, 1520 feet west of the shaft, on the 900 level, has been advanced 21 feet; total length, 223 feet; face in clay and porphyry.

SAVAGE.—On the 1050 level the north drift started in the east drift, at a point 85 feet south of the shaft, was advanced 17 feet; total length, 53 feet; face in quartz giving low assays. Have resumed work in the north drift from the station and advanced same 30 feet. The west crosscut from the southeast drift, started at a point 225 feet from the shaft, was advanced 11 feet; total length, 41 feet; face in quartz and porphyry. The south drift was advanced 10 feet, making the total length 155 feet from the shaft. On the 1100 level the north drift from the shaft was advanced 12 feet; total length, 147 feet; face in quartz and porphyry. On the 12th floor they are extracting some pay ore.

CHOLLAR.—The north drift, 100 level, is now out 117 feet; the face is in hard porphyry with streaks of low-grade quartz through it.

The west crosscut on this level, 300 feet south of the north line, was extended 23 feet; total length, 100 feet; face in a mixture of porphyry and quartz of low assay value.

POROSI.—The south drift on the 450 level has been advanced 24 feet; total length, 324 feet; face in porphyry and clay with a streak of good ore from 3 to 4 inches wide running through it. The south drift, 50 feet above the 450 level, is out 55 feet; face in porphy and low-grade quartz.

WARD COMBINATION SHAFT.—The west drift from the 820 level, Ward shaft, is out 725 feet from the shaft; face in clay and porphyry.

BULLION.—The west drift from the station, 820 level, Ward shaft, is out 725 feet; face in clay and porphyry.

BALCHAS.—On the 800 level the north drift has been cleaned out and retimbered a distance of 30 feet, making its total length 335 feet from the shaft. During the week 25 tons of fair-grade ore were extracted and hoisted to the surface.

CROWN POINT.—The south drift from the top of the 700 level raise on the 600 level has been extended 14 feet since last report, and is now out 48 feet. The face continues in porphyry. The south drift on the 7th floor of the 700-level raise is out 35 feet; advanced 18 feet. The face is in quartz, about the same character and value as last week. Have stopped the north drift on the 700 level and started a south drift from the station on the 500 level. The drift is out 13 feet, the face being in a mixture of porphyry and low-grade quartz.

JUSTICE.—The south drift from the winze sunk from the Blaine tunnel has been extended 15 feet since last report; total length, 61 feet. The face shows a width of three to four feet of fair-grade milling ore.

Sao. BALCHAS.—The north drift on the 1150 level, from the top of the 1200 level raise, has been extended 10 feet during the past week; total length, 59 feet; face in a mixture of porphyry and low-grade quartz. We continue to save a few tons of fair-grade ore per week from the south raise on the 1150 level.

CON. CAL & VA.—On the 1650 level the drift running north from the end of the crosscut run east from the drift run north from the east crosscut No. 1 from the north drift from the winze—down 52 feet—has been extended during the week 30 feet; total length 126 feet; continuing in porphyry, clay and quartz of low assay value.

In our workings in the vicinity of the winze, down 20 feet, we have extracted 16 carloads of ore—about 15 tons—assaying \$26.80 per ton.

1000 level (the Rule drift): The drift running south, from the upraise, 50 feet up at a point 353 feet south from the shaft station has been extended 30 feet; total length 65 feet; continuing in porphyry showing clay separations. The drift running north from the west crosscut No. 1, 527 feet south from the shaft station, has been extended 12 feet; total length 32 feet; in porphyry with streaks of quartz.

An east crosscut (No. 4) started at a point 477 feet south from the shaft station has been advanced 34 feet in a porphyry formation.

UNION MINE.—900 level—The Union Con. and Sierra Nevada joint east crosscut near the north line of the Union mine, running from the joint north drift which was run from the joint west drift, at a point 1520 feet west of shaft, has been extended during the week 21 feet; total length 233 feet; face in clay and porphyry.

MEXICAN.—1465 level—The upraise started near the mouth of the crosscut run west from the drift run south from the top of the upraise which was carried up 45 feet above the sill floor of this level, at a point 40 feet from the main north drift and 100 feet north from the south line of the mine, has been carried up during the week 8 feet; total height 66 feet; continuing in a very hard porphyry formation.

A joint work with the Ophir Company, we have been making repairs to the incline shaft

which extends downward from 1465 level station of the Ophir shaft.

OPHIR.—1465 level.—The drift run south from the crosscut run west from the main north drift, at a point 219 feet in from the mouth of the crosscut, has been extended during the week 19 feet; total length 25 feet; continuing in porphyry showing lines of quartz.

Have continued (jointly with the Mexican Company) the work of making repairs to the incline shaft which descends downward from the 1465 level station of the main shaft.

Central Tunnel.—The north drift from the main west drift has been reopened and repaired during the week 81 feet; total length reopened 277 feet. The face of this drift is within a short distance of the Mexican shaft.

ANDES.—420 level.—West crosscut No. 3 discontinued; face in hard rock. Have been timbering main north lateral drift. In West crosscut No. 1 from main north lateral drift we are chambering out for an upraise.

BEST & BELCHER.—On the 900 level during the past week the main north drift has been cleaned and repaired a distance of 160 feet.

GOULD & CUREY.—On the 200 level west crosscut No. 5, started from the northwest drift 432 feet from the main west drift, has been extended 16 feet; total length 1010 feet; face in hard porphyry.

HALE & NORCROSE.—900 level.—Advanced the south drift 12 feet; total length 182 feet; face in porphyry.

1100 level.—Advanced the south drift 14 feet; total length 181 feet; face in porphyry.

KENTUCK.—On the 1100 level in extending the south drift from the top of No. 1 upraise we have extracted a few tons of fair-grade ore. On the 1200 level the south drift from the Jacket incline is now in 44 feet and continues in low-grade gold ore.

OCCIDENTAL.—From the west ledge above the 400 level we have extracted about eight tons of ore of the average assay value of \$42 per ton.

WEST CON. VA. & CAL.—During the past week the west crosscut on the 1100 level run from a point 320 feet north of the shaft station has been extended 27 feet in hard quartzite, and is now in a total distance of 679 feet. The flow of water from the face has somewhat increased since the last report. The material in the face of the crosscut is unchanged.

ARIZONA.

SOUNDS BIG.—The *Mesa Free Press* says: The Mammoth mine, at Goldfield, took out 70 pounds of gold in an eight-hours' run last week. There is not a mine in America that can beat it. The rock that is being blasted out of the bed of the wash near the mill runs as high as \$20 per ton. There is said to be over one and one-half million of dollars in sight within a few yards of the mill. It is the richest mine in the United States to-day, yet there are many more up there just as rich awaiting development.

ANOTHER BIG STORY.—Mohave *Miner*: From the big bend of the Colorado comes the report of immense gold discoveries. The Smuggler mine, at Rustler, has a shaft six feet in depth and it is estimated that there is fully \$1000 in sight for every foot in depth. Some of the ore has been brought to town and is on exhibition at Harley Fay's. The rock is a glittering mass of gold. Many extensions have been located and it now looks as though the rush in there from the outside would be greater than that caused by the White Hills boom of two years ago. A few days since a young Mormon lad, who had been packing water to the camp, lost his burros and while searching for them he stumbled onto a reef of white, talcy-looking rock that appeared to be mineral bearing. He took some of the stuff to camp with him and had it tested in a horn spoon. The result was surprising. From a small piece of rock nearly a teaspoonful of gold was obtained. The metal was very heavy and appeared to be almost pure gold. The young man and John A. Reeves have located the ledge and the other day they made a crosscut on it, exposing eight feet of ore. The whole eight feet was sampled and gave returns of from \$100 to \$1000 in free gold to the ton. The owners say that the rock can be ground to a powder in the hand and then the gangue can be blown away, leaving in the palm bright, virgin gold. Mr. Reeves, who is an old miner, says he has never seen a better surface showing. In every gulch gold can be found in the gravel. These important gold finds again bring forth the story of the thousands of dollars taken from that region in the spring of 1869 by a number of adventurous prospectors.

COLORADO.

IN THE SAN JUAN COUNTRY.—Silverton *Miner*: The Nevada has had ore all winter and lately have struck additional hodies in the lower workings. Shipping will be begun shortly.

The Lackawana mine on Kendall mountain, lately sold to Chas. Fieber, is being worked by eight men and is producing valuable ore. The assays are light.

The Aspen mine, which for many years has been a constant shipper, is keeping up her reputation. She is working 25 men and is shipping about a carload of ore a week.

E. G. Stoiber, of the Silver Lake, will be in by the 15th of this month. Mr. Stoiber has been absent all winter traveling in Europe and Africa. In the meantime his valuable mine has not been idle. Over a hundred men are at present employed, and 1000 tons of concentrate await shipment by the packers as soon as the animals come in.

The Enterprise group of mines on Sultan mountain have been leased and bonded by W. H. Johns & Co., and will be worked the coming season by a force of about 15 men. The company have leased the Reed mill, where they

will concentrate the ore. A trial mill run was given a few days ago to a couple of cars, which exceeded the expectations of the owners.

IDAHO.

FREE-MILLING GOLD ORE.—GRANGEVILLE, Idaho: Late last fall considerable rich free-milling gold ore was found in the Dixie district, about 30 miles south of Elk City, in the Bitter Root mountains. Only a very little work had been done on the three or four claims, yet the veins appeared to be well defined. E. V. Johnstone, a prospector, is in from the Dixie district and reports a big strike. The drift on the Sampson was advanced 20 feet, and uncovered a 34-foot vein of free-milling ore which will average across the vein over \$100 per ton in gold. On the Dilliner claim the 104-foot drift was driven 18 feet and cut a solid vein nearly two feet wide which averages \$185 per ton in gold. The report of the strike had preceded Mr. Johnstone to Elk City and the people of that city were very much excited and have no doubt stamped into Dixie district. Mr. Johnstone came out to Grangeville for supplies and will go back just as soon as the trail is free of snow, he having made the trip part way on snowshoes. The trail will be open for pack animals in another month. Over \$60,000 have been taken out of the placers in Dixie district, which are said to be wonderfully rich.

MONTANA.

Cor. Butte Miner: The snow is commencing to melt in the mountains, and the placer miners on Cedar, Trout and Quartz creeks are preparing to commence work. The coming season promises to be the most prosperous for a number of years. Several enterprises which were commenced last year will be in a position this year to work large amounts of gravel and will add considerably to the gold yield of the year for this section.

The Missoula Placer Company, which has two large flumes and a giant hydraulic plant at the mouth of Quartz creek, is working ten men and will probably increase the force in a few weeks. It will commence sluicing in a few days.

Ensign & Co., five miles above, are working, and will probably take out considerable money this summer.

Ancker & Walters have a 40-inch flume, 800 feet in length. They struck bedrock late last season and found good pay. They have a 16-foot bank of gravel.

Monteleus Bros. have 400 feet of flume, the end of which is within about two feet of bedrock. They will commence work immediately. Silverman & Newman have a 40-inch flume on the old Bisskin diggings. They have whipsawed 5000 feet of lumber during the winter and are prepared to handle a great deal of ground this season.

West & Stern are drifting on the creek above and have made good pay all winter. They will probably continue all summer. About three weeks ago they found a \$40 nugget.

There are a number of prospectors already looking for placers, and it is thought that several new flume enterprises will be inaugurated this season. The country yielded a great deal of gold when mined in a primitive way by the early miners, but with the building of large bedrock flumes and the introduction of hydraulics there has come a new era to this section which promises to make it a great placer mining district.

The first of these large fluming propositions to be successfully inaugurated was that of the La Casse brothers on Cedar creek. For the last two years this has yielded very handsome profits and is making the owners rich. Last summer's yield from this claim was about \$18,000. Each year they are able to handle a larger amount of ground.

There are large bodies of gravel in many of the gulches. These need only the application of scientific methods to make them immensely profitable. There is a great deal of gold quartz in the country. This is also attracting attention and several mining enterprises of this description have already been inaugurated.

On Nine Mile creek the Nine Mile Mining Company has been forced to a temporary suspension owing to the large amount of surface water from the melting snows. The mine is looking better than at any time during its previous history. The recent cleanups from their 20-stamp mill have been very satisfactory.

A recent strike was made on the property of the Sam Martly Mining Company, which adjoins the Nine Mile claim. A five-foot body of high-grade free-milling ore was struck. Arrangements will probably be made to work it in the 20-stamp mill of the Nine Mile Company.

OUT OF WORK.—Butte *Inter-Mountain*, April 14: On account of the Great Northern strike, 700 men in the employ of the Boston & Montana are thrown out of work, and a like number may be similarly affected at Great Falls if the strike continues much longer.

The Butte & Boston will not be affected to a great extent, as the matter now going to Great Falls will be shipped East. The Anaconda Co. will soon be obliged to get its supplies of fuel and lumber via the Montana Union if the strike is prolonged. Aside from these difficulties, everything is in operation as usual.

THE EMPIRE SOLD.—J. Henry Longmaid was in Butte on Friday. He said he had just sold out the Empire mine, near Helena, for \$15,000 cash. With the property goes five lawsuits, one being for \$100,000. Sam Ward and others are the purchasers. Mr. Longmaid understood that the Pigan Mining Co. would work the Empire, they having adjoining interests. Relative to the Penobscot, which Mr. Longmaid owns exclusively, he says it is yielding a profit of about \$4000 per month. On the 2d inst. the mill cleanup was \$4200 and on the 7th, \$2800, making a product of \$7000 in ten days. He reports having struck a chnt of ore recently that

mille \$20 to the ton on the plates. This ore body has been proved 50x40 feet, and he has every reason to expect that when it is fully opened up he will have 200x600 cubic feet of this class of ore hocked out.

UTAH.

Park City Record: On the 5th a clean-up was made at the Mareac mill and refinery and the following shipment made to the Omaha and Grant Smelting Company: Refinery cleanings, lots 1 and 2, containing 68 sacks; assay value, 3026.95 ounces of silver. Residue, lots 16 to 22; assay value, 4722.50 ounces of silver and 106.162 ounces of gold, the latter valued at \$2194.37. Lead carbonates, lots 1 and 2; assay value, 4310.24 ounces of silver. Base sulphides, lot 1; assay value, 8511.63 ounces of silver, making a grand total of 22,371.29 ounces of silver and \$2194.37 in gold.

BRITISH COLUMBIA.

SUBAQUEOUS MINING.—Nelson *Miner*: Subaqueous mining along the Fraser and Thompson rivers has been prosecuted with a vigor which has not before been shown in British Columbia. The Finch Mining Company has commenced operations at the junction of the Thompson with the Fraser river. The capital in this company is all from Pittsburg. The Vancouver company, known as the Kanaka Bar Gold Dredging Company Limited, has also commenced operations.

HYDRAULIC WORK IN CARIBOO.—John B. Hobson, the consulting engineer of the Horsey and Cariboo Hydraulic Mining Companies, has returned to Cariboo from California. He has with him a staff of millwrights and will proceed with the erection of a sawmill and the getting out of the necessary cut for the operation of his companies. He reports the steel pipe to be already on the ground, and expects to proceed with laying the same and the several miles of necessary ditching as soon as the snow is off the ground and the season opens.

Patents Issued to Pacific Coast Inventors.

Reported by Dewey & Co., Pioneer Patent Solicitors for Pacific Coast, 220 Market St., S. F.

518,091.—SAFETY GAS COCK.—Clot & Malwald, S. F.
518,053.—LUBRICATOR.—J. Q. Finch, S. F.
518,140.—CAR COUPLING.—S. J. Ford, Placerville, Cal.
518,061.—SPRING REGULATOR.—H. B. Gale, S. F.
517,940.—CAR COUPLING.—C. W. Hinton, Los Angeles, Cal.
518,103.—MEASURING INSTRUMENT.—L. M. Hodge, San Jose, Cal.
518,105.—CAN HEADER.—N. Jensen, Astoria, Or.
517,866.—GOVERNOR.—N. S. Keith, S. F.
517,951.—PIANO ACTION.—F. W. Kingle, Los Angeles, Cal.
517,930.—BALING PRESS.—Murphy & Richardson, Mountain View, Cal.
518,045.—ILLUMINATING FLOOR.—E. L. Ransome, Oakland, Cal.
518,077.—DOOR BELL.—J. R. Sauter, S. F.
517,909.—WOODEN PIPE.—E. T. Wheeler, Los Angeles, Cal.
517,943.—TIME INDICATOR.—C. Worth, Los Angeles, Cal.
NOTE.—Copies of U. S. and Foreign patents furnished by Dewey & Co. in the shortest time possible (by mail for telegraphic order). American and Foreign patents obtained, and general patent business for Pacific Coast inventors transacted with perfect security, at reasonable rates, and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey & Co.'s Scientific Press U. S. and Foreign Patent Agency, the following are worthy of special mention:

LUBRICATOR.—John Q. Finch, San Francisco. No. 518,053. Dated April 10, 1894. This invention relates to improvements in lubricating devices for machinery. The object is to provide an automatic feeding cup which will supply a thin film of oil to the surface to be lubricated, while the parts are in motion, but which will cease to feed whenever the parts are quiescent, thus economizing the amount of oil which is used, and allowing no waste, drip, or leakage, while the machinery is idle. It consists of a cup adapted to be applied to any moving part, and having a central cone extending up into its interior, and in line with a passage which leads down to the surface to be lubricated. Within this cone is a metallic conductor, impervious to oil, which is bent so that one end dips into the oil within the cup, the conductor rising over the top of the cone which is above the surface of the oil, and thence passing down into contact with the surface to be lubricated. A slight tremulous motion of the conductor is the result, and this motion seems to act in conjunction with capillary attraction to raise the lubricant and cause it to pass down to the surface, but as soon as the machinery is quiet, and there is no motion of the conductor, the oil ceases to feed.

CAN HEADING MACHINE.—Mathias Jensen, Astoria, Or. No. 518,105. Dated April 10, 1894. This invention relates to an apparatus for the heading of cans. It consists of a can-head holder having a semicircular recess into which can heads are received, a semicircular hinged guide adapted to hold the can head to close and remain closed by the gravitation, a means for rocking the can-head holder to and from the can body, and a mechanism for delivering the cans successively into a holder in such position that the movement of the can-head holder will apply the head to the end of the can. It will be manifest that by duplicating the can-head holder and mechanism, that heads can be put upon the opposite ends of the can body simultaneously, and each can body is then delivered into a discharge chute as soon as the heads are applied, while a new one is received in readiness for the operation. The invention comprises many details of mechanical construction which cannot be well explained without engravings.

SAFETY GAS COCK.—George W. Cini and Gustav Malwald, San Francisco. No. 518,091. Dated

April 10, 1894. This invention relates to a safety attachment for gas burners. The object is to provide an automatically operating safety cock by which the flow of gas will be cut off if the main cock be accidentally opened. The supplemental cock has notches upon opposite sides, with a pawl which is adapted to engage one of the notches to retain the cock in an open position, and a lever is fulcrumed near the upper end of the burner having its lower end provided with a pawl to engage the other notch. The upper end extends across the burner tip to form an expandable bar, extending thence down upon the opposite side where it is affixed, so that the expansion of the transverse bar moves the lever about its fulcrum and causes it to engage the notch in the cock as long as the heat continues. If the gas should be put out, as soon as the bar became cool, the action of the lever would be to disengage the pawl and a weighted arm connected with the cock would immediately act, as soon as the disengagement takes place, to close the cock, thus automatically shutting off the flow of the gas, even though the main cock may be open.

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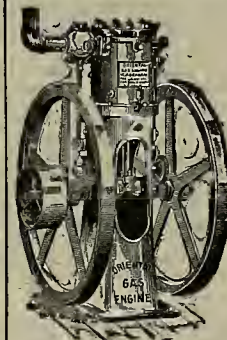
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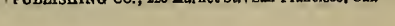
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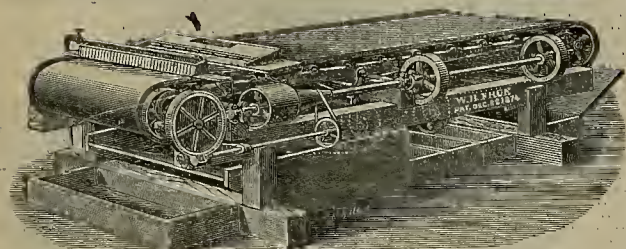
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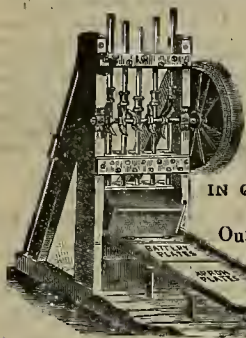
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AND PACIFIC ELECTRICAL REVIEW.

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VOLUME LXVIII.
Number 17.

SAN FRANCISCO, SATURDAY, APRIL 28, 1894.

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SINGLE COPIES, 10 CENTS.

The Case Automatic Engine.

The cuts herewith presented illustrate the Case Automatic High Speed Engine for small powers. Parke & Lacy are the San Francisco agents. Fig. 1 exhibits the engine equipped with a throttle governor as in the other forms of this engine.

The cut-off valve is of the plug type, perfectly balanced, and made with a slight taper so that it can always be kept tight. Its only duty is to define the point of cut-off, the admission, release and exhaust closure being controlled by the rocking of the cylinder which forms a valve action.

The lower half of the case forms a reservoir for oil and

that in the other, and very smooth running is thus obtained.

It is claimed that this engine runs at a higher speed than possible for a single cylinder engine of equivalent power, and the duplex feature in connection with light running parts marks the farthest advance in modern high-speed engine development.

A Drilling Contest.

On "Miners' Day," May 22d, at the Midwinter Fair, there will be a series of drilling contests, under the auspices of the Miners' Association executive committee, free to any competitor on the Pacific coast. It is thought that

counties. Of course, one part of the commonwealth can not be hurt without indirect injury to all, but if the dry summer of '94 will direct more attention to the mineral wealth of the State it will be a blessing in disguise.

A Great Advantage.

California's greatest present advantage is in the possession of its gold mines. The occupation of gold mining is the one industry to-day that is a prosperous one, and with the broadest horizon, because the product is steadily increasing in purchasing power.

While regrettable in the abstract, yet it is a patent fact that the value of a gold dollar was never greater than to-

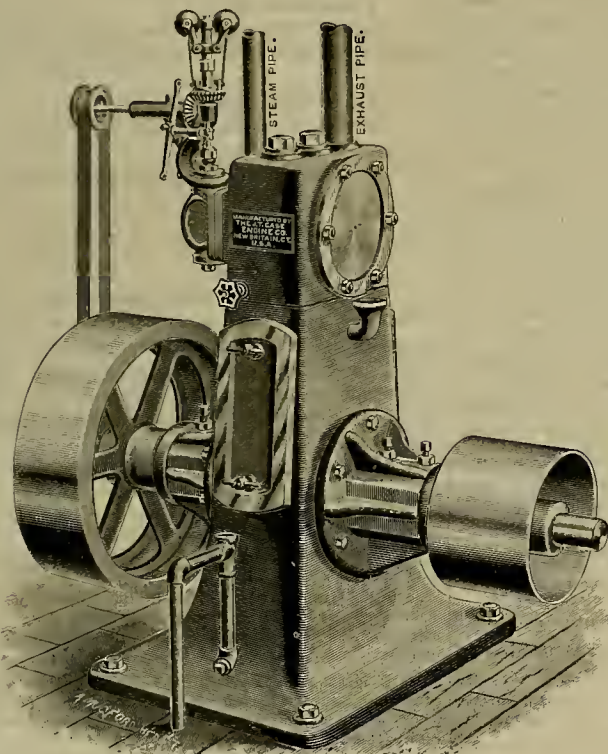


FIG. 1.

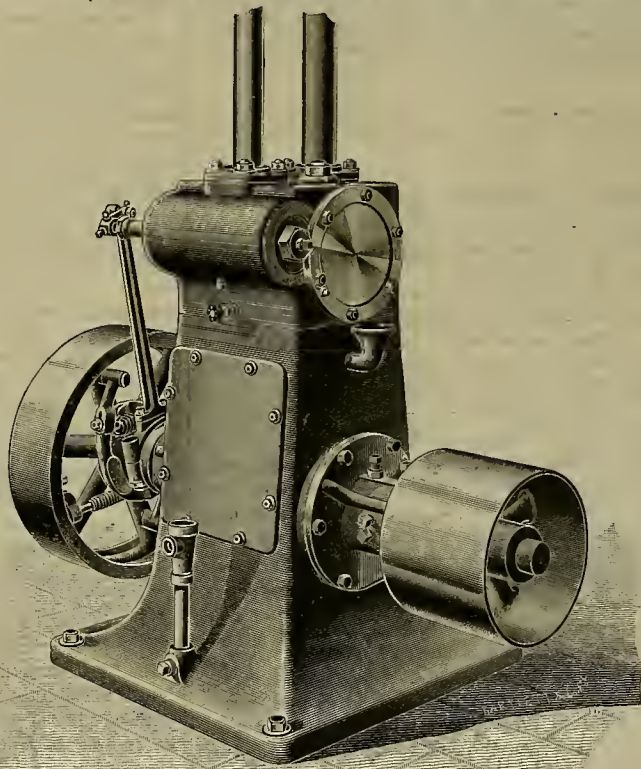


FIG. 2.

THE CASE AUTOMATIC ENGINE.

water, into which the crank-pin dips at each revolution.

The lubricant is conveyed to the bearings at every stroke automatically by pockets in the crank-discs; after the oil has done its work on the bearings it returns to the case again by gravitation. Any excess, which would naturally work out on the shaft, is thrown off by centrifugal action, from ring wipers, and returned by a separate passage to the case; thus the same lubricant is used over and over again. The oil and water find their way through small openings to a settling chamber below the reservoir, and being away from the churning action of the crank, the oil separates from the water and returns to the upper case. A stand-pipe is connected with the bottom of the settling chamber, and consequently the overflow itself is always water. The cylinder is lubricated by an efficient sight feed oiler, furnished with each engine, to be connected to the steam pipe.

Fig. 2 shows the double engine made by combining two cylinders in one frame. The crank is a solid steel forging with pins set opposite.

The throw of metal in one cylinder counterbalances

if mining superintendents have competitive local contests they can send good drillers to compete. Entries close May 15th. Superintendent E. H. Benjamin is in charge, and says that all holes drilled in this contest are to be "down holes" in hard Rocklin granite. Single-hand drillers will use five-eighths steel and four-pound hammers. Double teams and teams of three will use seven-eighths steel and eight-pound hammers. The time of drilling will be 15 minutes, each man to furnish and sharpen his own tools, forges and anvils to be furnished for this purpose by the mining committee.

For single-hand drilling the first prize will be \$200 and the second \$50. For double-team drilling the first prize will be \$200 and the second prize \$100. For drilling in teams of three the first prize will be \$300 and the second prize \$150. These prizes aggregate \$1000, and considerable interest will undoubtedly be manifested in the contests.

FROM all parts of the State comes the cry "a dry year." This, while affecting the agricultural interests of the State, does not directly injure the prospects of the mining

day; its purchasing power has increased and is increasing; the earning power of an invested dollar in real estate or business is less than at any time in the century, but a dollar will to-day buy more of anything that is for sale than it would one year, or ten years, or fifty years ago.

This naturally inures to California's present and permanent advantage, and it is a matter of congratulation to the nation that in these troublous times when the world is draining gold away from us that there are natural storehouses of the yellow metal to be unlocked. In the present crisis 'tis the country's salvation.

THE gathering of the "Industrials" at the National Capital elicits countless columns of editorial comment, including advice, prophecy and denunciation. In general there seems to be a confounding of cause and effect. All that the present movement needs to make it formidable is an efficient leader; were he to appear there would be real danger. So far there is no coherence in the plan. To attempt to make party or partisan advantage of the movement is mischievous and only augments the probability of grave trouble.

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San Francisco, April 28, 1894.

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THE fact that France has a Presidential election next November excites envy in the minds of many in this country.

"MINERS' DAY," May 22d, at the Midwinter Fair will be a big day. Preparations are making to have it an occasion worthy of remembrance, and there is considerable interest in the coming event.

THE *Monthly Messenger*, published at Kansas City, comes to hand, making the editorial claim that it is "endowed with power from on high." That, if so, ought to be a pretty good "pull" for any kind of a messenger.

ELSEWHERE Mr. Almarin B. Paul discusses "California vs. Colorado Milling," with characteristic positiveness. Long observation and close observation have given him practical ideas on this subject, and in this as in kindred subjects intelligent discussion always results in progress.

IT is reported from the City of Mexico that a retaliatory measure against the United States, England and other anti-silver countries is being considered. The plan is to increase the Mexican import duties 25 per cent. A strong combination of the Mexican and Central American republics is hinted at. Mexico is not in a condition to "retaliate" on any country, nor is retaliation good business. Co-operation is better and more satisfactory in the long run, or the short run.

Needlessly Worried.

The Chicago *Tribune* has been reading its MINING AND SCIENTIFIC PRESS with more than ordinary care and is in a state of mind. The unusual activity in gold mining in this State causes the *Tribune* to think that it thinks that there is to be an overproduction of gold, and that the yellow metal is to depreciate in purchasing power. The *Tribune* has long talked of pig tin, pig iron, pig silver, and now fears it must talk of pig gold. It cites the gold output of the State in an argument that there is now less use than ever for silver. The *Tribune* seems as little acquainted with the law of supply and demand as the Arabs at the sack of Samarcand, when, after looting the treasure house, they went around crying, "I will give a great deal of this yellow metal for a little that is white." The *Tribune's* worry about gold is as far from the facts as its frantic sophistries regarding silver. The next thing it will discover will be probably a plethora of diamonds, depreciating the market.

The output of gold will not *per se* decrease the demand for silver; the world grows as well as moves, and our Chicago contemporary should adjust its views in consonance with the wide limits of the subject.

Times Out of Joint.

Men are marching in an aimless way toward the National Capital with a vague idea that "the Government" must do something for them, in ignorance or forgetfulness of the fact that "the Government" is not an institution apart, but is the will of the people, their will, and the will of the rest of us. Their idleness is partly their own fault, partly their own misfortune; they have rights and wrongs; some of them beat their way out here and are now returning.

Meanwhile the banks of this city and all over the country have more idle money than they know what to do with; the same as there are more idle men than the country knows what to do with. Money cannot be loaned at six per cent; idle money goes begging for investment, while idle men go begging for work—men and money alike seeking employment.

The cause of all this is lack of confidence. Confidence is a plant of slow growth and is quickly stunted. The present paralysis is occasioned by a general fear, a widespread distrust, a universal intention to do nothing, risk nothing till the future develops.

In the minds of millions is a vague, shadowy notion that has never assumed the dignity of a thought, that nothing is now safe but ready money; nothing sure but actual coin, and that in shape to be held and handled; hence securities are valueless, real estate depreciated, enterprise languishing and business stagnant. Every one is striving to correctly predicate the future and all are seized with the idea that some change is impending whereby they can profit if they only have the ready cash to utilize when the change is manifest.

This would appear to be the reason for the present abnormal state of things—men and money both out of work—each needing the other, yet repellent instead of mutually beneficial.

The great, general, constant law of supply and demand seems suspended, and in this lies the abnormal element of the situation. The law of supply and demand is the general fundamental law underlying all else; it is the mainspring of all business; it is a measureless force; a constant impulse. Demand was created for supply and supply was created for demand, and they have the same affinity for each other that oxygen has for fire. What injures the one, injures the other.

Natural law governs all things mundane, including supply and demand; and, though the times are out of joint and there is a dreadful disquietude and unrest, yet there can be at the worst only a temporary suspension of this natural law—a constant force of nature that can no more be suspended or repealed than can the law of gravitation. It is claimed that three things must first be settled—the tariff must be assured, there must be restriction of immigration, and an increase in the volume of the currency; but beyond and above all these is the need of confidence and the resumption of the interchange of the law of supply and demand. All else is a makeshift, and the business world will not revolve as usual on its axis till there is an equilibrium. Natural law is the rule of the universe, and is the only foundation upon which man can build.

The Latest Silver Proposition.

The fact that nothing is ever settled until it is settled right is exemplified by the universal interest manifested by Europe in the silver question. Bimetallism is as much the leading topic in the old world as the tariff or the march of the industrialists in the new. The leaders of finance in France, Germany and England are giving their best attention to the present problem.

Next Wednesday an international bimetallic conference will be held in London. It will be a practical effort to settle upon a definite line of action. Just at present the proposition of Dr. Arendt appears to meet with the most approval. It is this: That the United States, England, Germany and France shall agree to receive and keep, free of charge, silver bars weighing five kilogrammes each, and shall issue gratuitously certificates against the same, these certificates to be exchangeable for the bars. The price of the bars would be fixed annually by a majority of the States concerned, whose representatives would meet every October. He proposes that at that annual conference each country named shall have one delegate for every million of its population; that is, the United States to have seventy delegates; England, thirty-nine; Germany, forty; France, fifty.

The objections to this scheme are too manifest to need recital. It is not likely that the idea will be given more than quasi endorsement. But it is something to see that our European brethren are doing some walking themselves. This country is not the only one deeply concerned in the correct solution of the silver problem.

There is considerable inequality in the per capita circ-

lation of currency in the four nations referred to, as the following table shows:

	PER CAPITA CIRCULATION.			
	Gold.	Silver.	P. per.	Total.
United States.....	\$9 01	\$9 18	\$6 15	\$24 34
England.....	14 47	2 63	1 32	18 42
Germany.....	12 12	4 26	2 16	18 54
France.....	20 52	17 95	2 09	40 56

The amount of gold and silver produced by each country must also enter into the equation.

However, the result of next Wednesday's conference, which is at once a political and financial gathering, will be awaited with considerable interest. It is as important to Europe as it is to America.

Assaying Concentrated Sulphurets.

TO THE EDITOR:—In response to some inquiries of professional assayers as to the method followed by the writer in assaying concentrated sulphurets for gold and silver, the following remarks are self-explanatory: (291½ grains of ore constitute an assay unit; every assay prill of 1-100 grain represents one ounce of metal.)

The sample is not roasted, but an alkaline sulphureted slag is avoided in smelting, by oxidizing nearly all, but not the whole of the sulphur by nitre, depending upon the complete conversion of the galena to metallic lead by means of iron. Sufficient silica is also added to decompose the sulphate and arsenate alkaline formed on deflagration and convert it into a sin gulo silicate. A very basic iron slag is avoided on account of its high specific gravity.

The assay mixture used and kept on hand, which is also used, but in increased proportion, for quartz and earthy gold and silver ores, has the following composition: One part litharge, one part bicarbonate of soda, one-tenth part flour. It needs sieving through a wire sieve.

The concentrated sulphurets are dressed for assay as follows:

I. Pure pyrites.

1 part (291½ grains) sulphurets.

1 part quartz sands.

3 parts assay mixture—900 grains, which can be measured off with sufficient accuracy in a glass of correct size.

1½ parts pulv. nitre.

Add one or two heavy nails and give a liberal borax cover.

II. Concentrates carrying 50% of pyrites—Iron.

1 part of ore.

½ part of quartz sands.

3 parts assay mixture.

¾ parts pulv. nitre.

2 heavy nails with liberal borax cover.

Melt for 30 minutes in a hydro-carbon furnace with strong final heat. The soft lead button should weigh about 375 grains. Special attention is called to the importance of not adding too much silver to the assay prill for parting, on account of loss of gold by too fine a subdivision—three parts of silver to one of gold as near as possible.

Auburn, April 26, 1894. G. F. DEETKEN, M. E.

Personals.

SUPT. GORHAM of the Potosi, Chollar and Bnllion is again on the Comstock.

JAMES E. MILLS, a mineralogist in the employ of the F. L. Ames estate and a Boston syndicate, is in the city. He has for some months been examining the gold resources of Plumas county.

W. F. HILLYER of Leavenworth, Wash., reports good gold-producing mines in his section. Several claims are in process of development; and when six months ago there was but one house, there are now 700 people.

SECY A. W. HAVENS of the Con. Cal. & Va. Co. has just celebrated the twentieth anniversary of his incumbency of the secretaryship. This enormous sum of \$54,000,000 has been paid to stockholders in dividends by Mr. Havens.

JUDOR WALSH was buried last Saturday. He was a pioneer, and 43 years ago was manager of the Gold Hill quartz mine at Grass Valley. He was prominent in the early years of the Comstock excitement. The Judge was over 80 years old at the time of his death.

REV. MR. NICHOLAS of Sonora is said to have the only chnroh in California that has a gold mine under it. At the Episcopal convention in this city last Wednesday his bishop said: "The principal thoroughfare of Sonora is the richest street in California. There is so much gold under the main street that men have offered to construct a complete sawyer etym in the town simply to get the quartz which may be dug up. The poorest people there walk over millions of dollars' worth of gold daily."

WASHINGTON officials view with disquietude the approach of the "Industrialists." The marshal of the district has issued a proclamation warning them to keep the peace; two resolutions have been introduced in the House—one providing for the maintenance of the Industrialists in Washington; another making the members of the Industrial Army soldiers of the regular army for one year, and employing them on public works. Ridiculous legislation seems to have reached its limit.

General Mining Notes.

THE McQuay claim at Elk Creek, Colo., is reported to be shipping ore which gives returns of \$150 in gold to the ton.

THE time for performing assessment work on British Columbia mineral claims during the current year has practically been extended to July 31, 1895.

LEADVILLE, COLO., is producing from its gold belt 500 ounces of gold daily. This product is derived almost entirely from four mines, three of which have been opened within the last six months.

THE *Mountain Echo* says the rumor that has gone abroad to the effect that the Utica Mining Company of Angels has sold its interests in Angeles to an English syndicate is wholly without foundation.

THE Baltimore Mining and Milling Co. has been incorporated by W. H. Coburn, S. A. Riley, H. H. Jones, E. J. Edwards and E. K. Gny, to operate in El Paso county, Col., with \$1,000,000 capital stock.

PHENOMENALLY rich gold discoveries are reported in Dixie district, near Boise, Idaho. Rook is said to have been found that runs thousands of dollars to the ton. Very rich placer ground has also been found.

THE Nevada City *Herald* is informed that a party of about 50 mining men, all capitalists, are coming from Utah to be at the Midwinter Fair on Miners' Day, and that a dozen or more of them are going to Nevada county afterward with a view to making investments.

THE Seminole Gold Mining and Milling Company of Summerville, Tuolumne county, has incorporated. The capital stock is \$300,000. The directors are Emory J. Landers, J. T. Rooney and T. W. Wells, of Sonora, W. B. Moore of Alameda, and Ransom W. Rockwell of Seattle, Wash.

THE Ross Hill Gold Mining Company has been organized by James M. Wishart, E. H. Wishart, Noah A. Walker and J. M. Davis of Oakland, and H. M. Shaw of San Francisco, with a capital stock of \$100,000, of which \$60,000 has been subscribed. The principal office of the company is in Oakland.

THE Americans Gold Mining and Milling Company was lately incorporated in Gilpin county, Colorado, with a capital stock of \$700,000. The Americans group of mines includes the Fisk, Blythe, Grond Hog and Columbus veins. It is the purpose of the company to build and equip a stamp mill to reduce the ores from those mines.

THE *Tidings* hears that a company is to be formed in Grass Valley for the purpose of purchasing a complete diamond drilling outfit, to prospect the ledges in this vicinity. No doubt such a company would find plenty of work, and as these drills have been successfully used in other places, we see no reason why they would not pay here.

SUPERINTENDENT AEAIR informs a *Transcript* reporter that pipes are being laid and that the waste water of the North Star mine will soon be utilized for generating electricity to light all the mine buildings. Electricity will be especially valuable in lighting the mill and will be a convenience in the hoisting works, dry house, office and other buildings.

CRIPPLE CREEK (COLO.) MINES, comprising the Queen of the Hills, Vanadium, Hidden Treasure and Baby Ruth, located on Battle Mountain adjoining the Anna Lee and Portland, have been sold for \$100,000, to W. S. Stratton, James Burns, James Doyle and John Harnan, owners of the Portland, Bohail and Scranton. The new property will belong to the Portland company.

COCHITI is the location of the latest ore find in New Mexico. It is about 40 miles southwest of Santa Fe, on the west side of the Rio Grande river. The ore is quartz, some of it being mixed with iron and copper pyrites. It is high grade and carries about equal values in both gold and silver. The veins are large, and in granite, or in contact between granite and porphyry. Several hundred prospectors are there now, the most of them coming from Colorado.

AN eight-inch pump is being put in at the Nevada City mine and will be used later on to pump water up to the drain tunnel. It is the intention of Superintendent Shoecraft to sink the shaft another hundred feet, and a station is now being made at the 500 level. The work of sinking will commence shortly. The mine is looking fine and very rich rock is being taken out, some of it being so rich that it is not milled, but is sent to the Selby smelting works to be reduced.

A FORMER Nevada writes to the *Reno Gazette* as follows, of the Broken Hill mines in New South Wales: "We have, without doubt, the greatest silver-lead mine in the world, and notwithstanding the very low price in silver and lead, we continue to pay \$240,000 per month in dividends. Our operations, however, are on a very large scale and we are treating about 10,000 tons of ore per week. Our output of silver is on an average a little over 250,000 ounces per week, and our output of lead about 900 tons per week."

THE National Bank of Savannah recently forwarded a silver dollar which had been defaced in a fire, but was of full weight, to the redemption agent at Washington. This agent sent it to the Philadelphia Mint as undercurrent coin. Superintendent Townsend at Philadelphia remitted 43 cents as its bullion value. The bank official wrote to him, pointing out that the silver dollar was of full weight and only slightly defaced. He failed to see why he should receive only 43 cents for it. The reply came that defaced coins were redeemable at only their bullion value.

ACTIVE OPERATIONS are soon to be commenced on the ochre mine, says the *Calaveras Chronicle*, about two miles from Valley Spring. A combine has been made of all the leading dealers in paints in San Francisco. Machinery will be put in place to grind the ochre and it will be shipped in barrels to San Francisco, where it will be mixed and made ready for use. The ochre obtained is said to be of an extremely fine quality and deeply colored, yellow predominating, although red, green, blue and black have been found. When once in operation the "paint" mine will give employment to quite a number of men and its owners will be well paid.

THE San Juan placers in southeastern Utah have been abandoned. Machinery was put in at a considerable expense,

but failed to extract the gold. There is gold in paying quantities in the placers, but it is almost as fine as flour and will have to be put through a process of amalgamation before it can be saved. The gold, unlike most placers, is in a cement formation that is almost impervious to water, and the methods of washing and sluicing will not dissolve the cement. These placers will have to be worked in a similar manner to gold-bearing rock, by the usual milling process, before the fine gold can be successfully extracted from the cement.

SAMUEL A. ALLERTON has instituted proceedings in the United States District Court at Sioux Falls, S. D., for the recovery of \$3,342,270 from the Homestake No. 2 Mining Company. The claim which the complainant puts forward was assigned to him by James J. Sullivan of Chicago, who purchased the mine in 1878, paying \$10,000 down and promising \$30,000 more. The mine proved of more value than was hoped for by the prospectors and Mr. Sullivan's purchase was repudiated and he assigned the claim to Allerton. An accounting of the profits that have accrued from a 52 interest since 1878 is demanded. Offers of settlement have been made by the company, which range from \$2,000,000 to \$3,000,000.

SAYS the Virginia *Enterprise*: Colonel Curtis looks upon the extension of the Central tunnel westward in Ophir ground as one of the most important movements made in the history of the Comstock lode, as it will explore a region the surface workings of which proved prolific in gold-bearing quartz. The tunnel will penetrate the ground formerly known as the Burning Moscow below the old levels, with a highly favorable prospect that an important ore discovery may result. A development in that direction would be followed by the immediate extension of the Sntro tunnel under Mount Davidson and all of the principal companies on the lode would extend explorations westward in entirely new ground.

THE mail route between Trinity Center and old Cecilville, over Salmon mountains, has been let to a party in San Francisco. A Trinity Center correspondent of the *Weaverville Journal* says: We understand that the rate is less than \$1500 per annum for bi-weekly service of 45 miles each way. This is a snowshoe route, and will require two men for two months on snowshoes, at \$75 per month each, and if the San Francisco party is one of the men, he will think that carrying the mail on snowshoes over mountain trails is not a very enjoyable pastime. A little practical experience in carrying the mails over our mountain routes is about the only remedy that will serve to check outsiders from putting in bids for mail contracts at starvation rates.

AN Olympia, Wash., dispatch announces that Don Carlos Bnell is going to Westport, where he is erecting a plant to recover gold from the black sand along the coast of Oregon and Washington. The plant is located at Westport and consists of a number of tanks and a powerful electric battery. The gold is dissolved from the sand by a solution discovered by Bnell, drawn from the tanks, and by the application of electricity the gold is separated. He says the sand will yield \$10 of flour gold to the ton of sand, and that enough exists on the Oregon and Washington beach to pay the national debt. He also has tests of platinum which he claims yields even better than gold. If Don Carlos has a successful method of extracting the gold from the black sand, Rothschild will be a pauper alongside of him. The gold is there all right enough, but of the thousands who have tried, no one has succeeded in getting the gold in one heap and the sand in another.

SO FAR, the California Debris Commission has issued permits under the Caminetti act to thirty-four mines. A regular report of the amount of work done is required from the manager of each mine. The one showing the largest amount of work is the Blue Gravel, at Smartsville, Yuba county, operated by the Excelsior Water and Mining Co. The monthly washings of this mine amount to over 60,000 cubic yards. The smallest is the Tanner Ravine mine, near Brownsville, in the same county. During the first month's operations after resumption of work the washings aggregated two cubic yards, and during the second month, two and a half. Two men and a boy are the working force there. So far, fifty-four applications have been made. The number is lessening, and it is thought there will not be many more this season. During the week a permit was issued to the Green Meadow mine, near Glencoe. Estimate is made that the hydraulic work now in operation under official permits is about ten per cent of the amount of that kind of mining in operation in this State before the anti-debris agitation.

General News Notes.

TO BOKEN there have been over 1,200,000 admissions to the Midwinter Fair.

FOUR THOUSAND Chinamen have registered in Boston under the Geary act.

GOLD to the amount of \$7,000,000 went to Europe from New York during the week.

COLONEL BAAOKINAINGA says he is a pauper and can't pay the \$15,000 damages awarded to Miss Pollard.

NEARLY 100,000,000 bushels of available wheat in the United States and Canada is reported by Bradstreets.

THE San Francisco Democracy have denounced Hill and Geary and have endorsed the Wilson tariff bill.

WHAAT has touched the lowest point on record at Chicago—57½ cents. The bears predict it will go to 50 cents.

DRAINING the week over 100,000 coal miners struck in Ohio and Pennsylvania. So far both sides are unyielding.

TRAINS on the Fort Wayne road now make the distance between New York and Chicago in eighteen hours.

THE largest gold coin in circulation is the "loaf" of Anam, which weighs as much as 325 United States dollars.

THE Great Northern railway strike is over. Concessions were made by both sides, and trains are running as usual.

CLAUDIA HERBASA, aged 120 years, died on Telegraph Hill in this city last Saturday. Her age was well authenticated.

THE property of the Nicaraguan Canal Company at Greytown has been seized by the Nicaraguan Government and sold for \$75,000.

THE passenger steamer Los Angeles was wrecked at Point Sur, on the Monterey coast, last Sunday morning. Eight lives were lost.

A new aluminous phosphates mineral, having some of the qualities of turquoise, has been discovered in the Camp Floyd district, Utah.

DRAINING the recent fiesta at San Diego joy was unrestrained, cowboys riding into saloons and assuaging great thirst without dismounting.

THE Board of Prison Directors have authorized Warden Hale of San Quentin to sell 3,000,000 jute hags, which he has on hand, for 5½ cents each.

MAJORA RATHBONE, of this city, last Saturday received a check for \$100,000 from M. Goguenheim & Sons, for his share in the Tepalaz, Mexico, copper mine.

IT is estimated that the new tariff bill will reduce revenues on wool and metal manufactures about \$36,000,000. The 1893 revenues were about \$58,000,000.

A MAXIMUM speed indicator for electric railways has been invented. An alarm bell in this device rings whenever the velocity for which it is set is attained.

AN execution for murder and the conviction of an assassin for murder in the first degree convinced San Franciscans on the 20th that hanging isn't "played out."

HOGAN's branch of the "Industrial Army" stole a Northern Pacific railway train at Butte, Montana, and went flying along to St. Paul at the rate of forty miles an hour.

THE Fleming-Ayere shingle mill, near Seattle, Wash., the largest concern of the kind in the Northwest, was totally destroyed by fire last Sunday night; loss, \$50,000.

"BILLY" MCGAHERAN, famous all over the United States by reason of his claim to the New Idria quicksilver mine, died in the hospital at Washington, D. C., last Tuesday.

AT Yaquina Bay, Oregon, collection district, last year, it cost at the rate of \$4240 to collect \$1.00. During the year 25 cents was collected at a cost to the Government of \$1060.

GEN. WEAVER, of Iowa, has been nominated for Congress by the Kansas Populists, but the inducements are not sufficient, and the General refuses to move to the Sunflower State.

IT is calculated that the stoppage of silver mining reduced this country's annual supply of gold by one-third, as about 33 per cent of the yearly yield of gold is taken out of silver mines.

THE Industrial Army still goes marching on. A new delegation has started from Boston. The Coxey men have arrived at Washington and will camp at the foot of the Washington monument.

THE House Committee on Coinage, Weights and Measures has side-tracked the Meyers' compromise silver bill and decided to report favorably Bland's bill for the free coinage of silver.

THE United States Supreme Court has decided that lager beer is not a "spirituous liquor" within the meaning of the statute prohibiting the introduction of spirituous liquor or wine into the Indian Territory.

THE Northern Pacific and the Union Pacific roads have pooled on the freights from the Cœur d'Alene lead-silver mines. The ore or concentrates are sent either to Denver or Pueblo, and the freight tariff is almost prohibitory.

IN the contest for the county cup for the best mineral exhibit at the Midwinter Fair, Nevada county has passed the 225,000th vote; El Dorado county is second on the list, with Placer, Amador and Tuolumne in the order mentioned.

THE *Western Democrat* of Missoula says that it has it on pretty reliable authority that Marcus Daly has floated \$5,000,000 in bonds of the Butte, Anaconda and Pacific railroad and that the money is now on the road from New York.

"THAT there are no present indications of any attempt to foreclose the Government's mortgage on the Pacific railroads," says Senator Brice, "but much depends upon what the security-holders behind the Government agree to do."

THE Southern Pacific Company operates a total of 7867.14 miles, of which 4470 are proprietary lines, 2128 leased lines and the balance affiliated lines. The gross transportation earnings for 1893 were \$53,946,667, and the operating expenses \$34,692,402.

JAMES SALOMAN, the celebrated banker, died at Coronado last Monday. He was a California pioneer and owned largely in the Anglo-American bank. He left a fortune estimated at \$12,000,000. His firm placed the first United States bond issue in Europe.

FROM South Africa comes the report that John Hays Hammond, who left here last summer to take charge as consulting engineer of the Rhodes-Barnato Syndicate gold mines, is leading an exploring party on a 1600-mile trip through the wilds of Matabeleland.

COMPARING British production with the output in the United States, the American output of pig iron in 1892 was 2,540,110 tons greater than that of Great Britain; during 1893 it was but 294,661 tons more. This decrease was almost entirely in the last half of the year.

THE new placer fields of New Mexico are located at the confluence of the Rio Hondo with the Rio Grande and extend north to a point near the Colorado line. According to reports results are astonishing, but it is said that the average run of dirt is about \$2 per yard as it comes.

J. A. LIONTHALL JR. has made an offer to the San Francisco supervisors to dispose of the garbage for San Francisco at a cost of \$125,000. He thinks that the plant would be almost self-supporting, as the grease, which is extracted by the naphtha process, has a value of 3½ cents a pound, and the dry garbage after it is deodorized and disinfected, brings from \$12 to \$1 a ton.

THE reported discovery of a wonderful deserted city in a remote section of the Sierra Madre mountains, in Durango, has been verified by Maurice Lentow and a party of explorers. They found a secret entrance to the city and made an exhaustive exploration. They returned laden with curiosities from the abandoned residences and temples. The population of the city could not have been less than 25,000.

A DOUBLE MURDER is reported from the Dos Cabezas mining camp in Mexico. Jack Redding and David Harper, wealthy

and prominent mining men, met and quarreled over a business which they agreed to settle with their revolvers. Both men fired at the same instant and both were shot dead in their tracks. They had been partners for a number of years, and until their fatal quarrel had always been fast friends.

THE Indiana Republican State Convention last Wednesday adopted the following in its platform: "We believe in a currency composed of gold, silver and paper, readily convertible at a fixed standard of value, and entirely under the national control, and we favor the imposition of increased tariff duties upon imports from all countries which oppose the coinage of silver upon a basis to be determined by an international congress for such a purpose."

THE Postoffice Department announces that no more dropping of letters into the mail cars will be allowed. Hereafter mail will not be taken on the railroad mail cars unless it first passes through the postoffice. The order was made because so many business men near railway stations mailed their letters on the train and it made a large amount of extra work for the mail clerks, time being used in stamping letters that was needed in sorting out mail between stations.

In an article on prospective railway building the *Railway Age* states that within the last 20 years over 107,500 miles have been added to the railway system of the United States, giving an average of 5379 miles a year. Within 30 years the railway system of this country has grown from 33,000 miles to 177,850 miles, and now aggregate nearly half the total mileage of the world. A vast mileage is yet to be built, and in increase of activity in this respect is already on hand. A list of 411 lines is given, aggregating a proposed length of over 22,500 miles and representing every one of the 48 States and Territories, the speedy construction of which appears to be demanded.

California vs. Colorado Milling.

TO THE EDITOR:—Having read with more or less interest the observations as respect the two styles of mills, or, more properly speaking, the drop and speed, I feel a little like putting in a few words, although I had about made up my mind to keep out of print, for the simple reason that it has never benefited me, and I don't know as it has others.

Forty-three years ago I made my first move in California in the milling of gold ores with the crude machinery of those early days, which it is not pertinent to the question at issue explain. From my beginning to the present time I have watched and studied closely the advance in mechanical construction of mills and all the multitude of plans for saving the precious metals, and while I say to all, carry out the ideas which give the greatest pleasure, independent of others, I nevertheless will give some views which are antagonistic to the Colorado idea of milling with a slow motion and high drop.

To begin with amalgamating in the battery, with all the fine devices now to be had for saving the precious metals; outside of it, it is not so essential a matter that one should entail an extra expense by way of lessened capacity of your battery in consequence of this slow motion. The grand point to accomplish with the battery is reducing the largest quantity of ore at the least expense. Amalgamate, if desired, to the highest per cent possible, but use the battery clearly for what it is made—to crush rock. When it comes to the weight of stamps, the Colorado idea (650 pounds) I consider nearer correct, though 700 to 750 pounds is not objectionable. In 1851, in Grass Valley, Nevada county, this question was carefully canvassed by testing the work of all weights from 500 to 1400 pounds on average ore, by a number of quartz miners, of whom I was one, and after full consideration of weight, speed, drop and execution (notwithstanding our stamps were crude the weight was the same), it was decided that 650 pounds gave the best figuring, and for at least 10 years I don't know of heavier being used. From that day to the present I have not varied from this weight, though I have advanced in speed.

With all the improved rock-breakers which can reduce to, say, even a five-eighths opening cheaper than stamps, there is no necessity for such weighty stamps as 800 to 1000 pounds each. It is a waste of money in power to lift, without a compensating amount of work.

I note further in your article you state that the California mill saves 94 per cent with concentrators and the Colorado mill 89 per cent without and with concentrators it will save 95 per cent. Well, I suppose I will be bringing condemnation on my head if I say I give no credit to any such results. Independence of thought has been my failing and enemy. I will say further that there is not a mill working gold ores with simply stamps, silver plates and concentrators that does not run away in its slimes and tails at least 20 per cent of the value, and the majority of them 35 per cent, unless in exceptional cases of working specimen rock. I have made too many tests on this point to accept any such data. I do not doubt that with some tests of tails, minus the run-off slimes, assays may be had which will show a less percentage of loss; but take a 10x10 tank, full of tails, with all the muddy water and let it fairly settle, then dry, sample and assay, and see how your 95 per cent agrees.

In South Africa (Jobannesburg) they have as fine mills, with all appliances, as in California, with skilled California mill men to operate them and, as a general thing, easier

ore to work, and see what they are doing with their tailings alone.

By way of information to many, I will give the figures. For a long time they were satisfied with results, yet condition of the ground compelled the saving of their tails. They in time investigated, and found a value in them, and by degrees the mills took up the working of them, and the following is the yield of same for the respective months of 1893-94:

	Ounces.
April, 1893, the yield from tails was in gold.....	18.577
May.....	21.278
June.....	24.564
July.....	24.616
August.....	30.403
September.....	31.354
October.....	33.587
November.....	36.546
December.....	38.825
January, 1894.....	41.204

I do not, however, take South Africa milling for my knowledge or experience, as I learned the lesson long before a mill was built in the Transvaal. It is a well-known fact among old quartz men that I have harped on this loss of gold for fully 35 years—have written volumes on it—and I have observed, too, that year by year there has been an advance in the percentage saved by improved appliances. Concentrators have been a great step forward—in fact, are indispensable for the majority of ores. New processes have also assisted, and none is more in the right direction, generally speaking, than the cyanide.

California has not yet reached her ultimatum of per cent of extraction, but she is yearly advancing, and in a few years more will be in the line of perfect milling. Thorough investigation by competent men will give many profitable surprises as to what gold you don't get. We pay too much attention to crushing rock and too little to securing the value of it. I give these ideas for the consideration of mining men. I know they will give a return of criticism for me. All such declarations, however, inspire investigation, and investigation will give improved results. Yours,

ALMARIN B. PAUL.

Room 4, Crocker Building, S. F., April 26, 1894.

Mexican Methods of Mining.

J. Howard Palmer, B. A., in London *Mining Journal*.

In a preceding article some mention was made of the frequent use of long adits in the mines, and of the steadiness and perseverance with which the Mexicans prove their lodes by this method. They have, however, still a good deal to learn in adit driving; the rise of the tunnel necessary to give proper drainage is generally a matter of guess work, and it never seems to enter their heads that it is more economical to drive straight ahead than to go winding about; the adits are apt to resemble a series of elongated S's, and their height and width are by no means fixed quantities. After all, these are not very grave faults, for if the vein shows favorably in the roof, or to the right or left, it is surely wiser to spoil the appearance of the work, rather than miss payable ore or lose the vein.

Rock drills and air compressors are beginning to come into use in Mexico, but the advantage of using them is somewhat doubtful, unless there is great urgency for the completion of the work in hand. Fuel is generally so dear, and not likely to become cheaper, that the comparative costs of machine drills and hand labor work out in favor of the latter for ordinary work. In fairly hard ground a gang of Mexicans will drive from three to four meters a week, at an inclusive cost varying between \$30 and \$40 per meter. Two air drills will, perhaps, accomplish ten meters per week, but each meter will cost from \$80 to \$100. Half of the expense of driving by machines will be incurred for fuel, upkeep of machinery, and the whole question of hand vs. machines resolves itself into one of the price of combustibles. When it is necessary to speedily unwater a mine by an adit, or to reach an already proved deposit in order to put a concern on a paying basis within a certain time, in such a case, of course, the advantages of using rock drills are incalculable; but under ordinary circumstances they are rather luxurious than otherwise. A further difficulty in the use of machine drills lies in the inability of the native miners to work them. Skilled drillmen have to be imported from England or the States, and if they fall ill or fail to agree with the Mexicans, the work must suffer until fresh men can be procured. Big mines, however, in which development work has to be well ahead of the stopes, can easily afford an installation of air-compressing machinery and drills, and the gain in time and efficiency will amply compensate for the increased expense of working.

The Mexicans are not very good timbermen, and the reason is that they do not have the necessary experience; timbering is not often required in the deep silver mines. In working the dry sulphide ores, at any rate, the veins are very compact, and the country rock being of primary for-

mation very seldom requires support. When there is any danger of a run the Mexicans prefer to build walls or arches of strong masonry, and in this method of securing the workings they are very clever indeed. In many districts timber large enough for mining purposes is simply not to be obtained except at prohibitive prices, and masonry is much cheaper and lasts forever. Still, timbers are often used in patches of wet and disintegrated ground, the spaces between them being filled in with poles two or three inches in diameter, placed closely together and supported by the large sets.

Stoping in Mexico is often carried on very carelessly, and without much regard for safety; in the eagerness to get out every available scrap of ore, pillars are taken down which should never have been meddled with, and a mine thus becomes dangerous to work in long before it is exhausted, and future development means much avoidable expense and trouble. The native mining is at its worst when the ore is found in rich stringers, between one and two feet wide. When this is the case, mining is apt to degenerate into "burrowing," without plan or system, and one finds drifts and winzes, through which it is scarcely possible to crawl, running in all possible directions. If an English company takes over a mine like this, perhaps the best way is to disregard the old workings altogether and start afresh well below them. It is no use looking for ore where Mexican miners have been before, for they scrape a vein as clean as dogs picking a bone, and only give up because water beats them.

Vertical shafts are not very common in Mexico, and a descent of one is not a particularly pleasant experience. Cages are rare and man engines are unknown, so the usual way of going down is to be tied to the cable. The means of support is a piece of strong webbing, broad in the middle and gradually diminishing to the thickness of a rope at each end, and called a *caballo*. The broad parts go around the person, and the ends are secured to the cable by a dove hitch or similar knot. One is tied up at the top and swung out over the mouth of the shaft, with a sensation, at first, of being "turned off" by Jack Ketch. Going down, it requires some practice to keep clear of the sides, which are not so squared off as they might be, and the trip probably ends with being soured in the dirty water of the sump below. The ordinary miners are not allowed to use the shaft, but have to go up and down by the ladder-way, which winds, more or less, spirally around the shaft and entirely distinct from it. By law every mine has to be provided with two outlets, and as fast as a shaft is sunk a ladder-way is made as well. It is not surprising that the Mexicans prefer to make use of shafts as little as possible so long as the means of hoisting men and material are so primitive. There are, however, some splendid shafts of entirely native construction. The shaft, for example, of the famous Valenciana mine at Guanajuato is 400 meters deep and 8 meters by 12 throughout, and employs six different hoisting engines, with cages and tonneles. Valenciana, however, is perhaps the largest and oldest mine in Mexico.

The Royal Gold Mine.

The greatest gold mine in Montana is now the lately developed Royal, at the head of Boulder creek, a small stream that puts into Flint creek, not far from the town of Drummond. This mine is now yielding a net profit of \$17,000 per month. The owners have spent \$70,000 in its development and in the erection of a ten-stamp mill, and a million dollars in cash would not buy it to-day. In fact it is paying one per cent a month on \$1,700,000, and it has ore enough in sight to last five years. There are probably dozens of almost equally valuable gold leads in Montana, hidden in the mountains. To develop a prospect into a mine takes a good deal of money and a good deal of courage. The men who discover the prospects have nerve enough but they rarely have any money. In many cases half a lifetime is spent by the owner of a good prospect trying to persuade capitalists to put money into the work of opening it up and demonstrating whether it is worth anything or not. The chief owner in the Royal is Nelson Bennett, of Tacoma, Washington. He made a fortune boring the long tunnel through the Cascade mountains for the Northern Pacific, and he increased his wealth by a lucky deal in Fairhaven, from which he got out in time to avoid the collapse which nearly ruined that town. Then he bought a big hotel and a morning newspaper in Tacoma, and just before the financial panic last summer he purchased a controlling interest in a bank. The bank went to pieces; the hotel did not pay and the newspaper sunk money, as most of the dailies in the West have done during the past year. Just in time to help Bennett out of an uncomfortably tight place came the rich strike in his mine. The Royal is now well developed by two tunnels and a shaft, and it shows the most remarkable body of rich gold ore known to exist anywhere in the United States.—North-west Magazine.

Mines and Mining in Grass Valley.

Written for the MINING AND SCIENTIFIC PRESS by Samuel Butler.

On several previous occasions attention has been directed to the fact that Grass Valley offers the best inducements for judicious investments of any mining district in California. We do not make this assertion with any degree of braggadocio, or for the purpose of misleading the unwary speculator. A close study of the history of the city and the geological formation of its mineral deposits must forcibly convince the intending investor of the truth of the above assertion. From its inception to the present time this district has enjoyed a steady and continuous growth. To-day it far excels in prosperity and population any previous era in its history. Our quartz veins are so great in extent and wealth that we regard our mines as being permanent and not subject to the fluctuations experienced in other and less favored mining districts.

In proof of these assertions I would like to reproduce an interesting interview which I recently had with a prominent capitalist, who has invested several hundred thousand dollars in this county. This gentleman, for reasons not necessary to divulge, requested that his name be withheld from publication. The substance of the interview is as follows: "Grass Valley is an ideal city. In my mind it is first and foremost in every respect of any mining town on the Pacific coast. No other mining district offers the same inducements and advantages west of the Rocky mountains. The railroad facilities are perfect. Where on the Pacific coast can you find a mining town so highly favored with railroad transportation? Consider the great saving effected by these advantages every year—something unknown to mining districts in more remote parts of the State. But this is only a small portion of the inducements held out by this district. However much we may desire cheap transportation in the development of our mines, the overwhelming attraction to capitalists is rich and productive ledges. Transportation is a secondary consideration to this. Without such prizes to offer it would be impossible to secure capital; but Grass Valley possesses this inducement in a degree not elsewhere found on the coast. Where can you find mines that have been so productive, considering the depth attained? Where is there a similar area in the State that has produced a like amount—\$120,000,000? There may be a few single exceptions, such as the Utica mine of Calaveras county—probably the only solitary exception at this time—but taken altogether there is no district that approaches in wealth of production the quartz-crowned empress of the Sierras. Here is deposited a network of veins unequalled in extent and wealth by any other locality in the State. In some cases the surface has only been scratched, while in others development work has not been conducted to any great degree. When these ledges are properly developed, who shall estimate the prosperity of Grass Valley? With cheaper motor power the future of this district is assured. What most surprises me is the fact that Grass Valley has not experienced a boom long ago. Had the district been located anywhere else, a great boom would have been precipitated years ago. But the policy of silurianism followed by the majority of your citizens has had a tendency to keep the merits of your mines in seclusion. It has also prevented capital from entering the district and developing the mines now idle. The abandonment of these old 'forty-nine' ways and the adoption of a more enterprising and progressive policy is greatly needed and would be highly beneficial to the best interests of the city. Capital is beginning to turn its attention to Grass Valley, and it rests with your citizens as to the kind of treatment it shall receive. In conclusion, I may say that I have visited nearly every mining city on this coast and I have invested in almost every State and Territory, but nowhere have I been so favorably impressed as with the great natural and artificial advantages offered by Grass Valley."

This is only one of the many eloquent tributes paid to this district because of its wealth and worth.

A short time ago, in company with A. W. Stoddart, superintendent of the Centennial mine, who is regarded as one of our foremost mining and mechanical engineers, I made a tour of the Osborne Hill mines. Osborne Hill is so well known to a large number of the readers of the PRESS that I deem a description of its topography and geological formation entirely unnecessary. In the very early history of Grass Valley this hill was one of its most noted and prosperous environments. It became a beehive of industry. Everywhere the hill was dotted with prospect holes, and miners were seen busily engaged extracting the precious metal. And then when these "holes" had reached what we consider a superficial depth, and water had been encountered, they were abandoned because of the crude methods in vogue at that time. Their intrinsic value had not diminished one iota. This was the

cause of the abandonment of a large number of promising mines in the early days. Attention is now being directed to these abandoned mines and their future development is a certainty. There are over 20 properties on this hill worthy of serious consideration at the hands of capitalists, and the successful development of the Osborne Hill, Centennial, Electric and Conlin mines cannot fail to bring this environment into prominence and be productive of good results.

The Centennial mine is situated on the summit of Osborne Hill. Although only two and a half miles from this city, it has an elevation of 3000 feet, making it 600 feet higher than Grass Valley. From the summit of the hill a splendid view of the surrounding country can be secured. Several points in Placer county are clearly observable. The Centennial is among the oldest locations in this district and has been worked at intervals since 1851. It was formerly known as the Wide Awake, and has an extent on the vein of 3000 by 600 feet. The course of the vein is north and south, having an angle of about 30° west. The average width of the vein is one foot. On the property there are two incline shafts, one having a depth of 500 and the other a depth of 650 feet. Operations are being conducted through the last-named shaft. Six levels have been opened with a maximum length from the shaft on the south of 200 feet and on the north of 600 feet. At the present time work is confined to the 650 levels north and south; and when the proper distance is reached, it is the intention of Mr. Stoddart to put an upraise and make connections with the original shaft, which is about 600 feet from the one through which developments are now being carried on. This action of the superintendent is justifiable, and will greatly facilitate the development of the mine.

It is evident that when the mine was reopened in 1876, by a company of practical miners, through the old shaft, operations were confined to the south of the shaft. In their anxiety to work some rich "stringers" encountered south of the shaft, the northern extremity of the ledge was neglected; and at the present time on the north side of the shaft there is a vein averaging a foot in thickness in purely "virgin" ground. The last crushing taken from this vein was in close proximity to the shaft and paid \$35 to the ton. From 1876 to 1882, \$500,000 was extracted by a party of miners, although the mine was worked on a very meager scale. On the property there is a commodious and substantial hoisting works fully equipped with all the modern appliances. There is ample room for a ten-stamp mill which it is the intention of the company to erect this summer. A six-inch pump relieves the mine of its water.

The superintendent informed your correspondent that when connections are made with the 650-foot level the old shaft will be repaired and a new hoisting works erected thereon. This will greatly add to the advantages now enjoyed and will be instrumental, from present indications, in developing an extensive property. The Centennial Company may be congratulated on the possession of a very promising property, and if they are "wise in their day and generation," they will spare no expense but make the development of the mine rapid and complete.

Developments are being pushed rapidly at the Osborne Hill mine, under the efficient superintendency of Mr. L. P. Goldstone. The Osborne Hill mine was located in 1850, and soon became famous as a gold producer. But, like most other mines, it has encountered difficulties. At a depth of 450 feet it yielded over \$2,000,000. The shaft is now at a depth of 700 feet, and drifting is being prosecuted north and south on the 500 level. The vein averages a foot in size and the ore is worth about \$35 a ton. About 35 men are employed at \$3 per diem. It is the intention of the Osborne Hill Company to erect a 20-stamp mill this summer. The owners of this mine are very fortunate, as the impression prevails here that it is destined to become one of the most extensive mines in the district.

The Electric mine is also situated on Osborne Hill, and, like most of the other mines in this district, has been worked at intervals. The property is regarded as being a very valuable one, and promises, when properly developed, to be very remunerative. The mine is being developed by Mr. Dan Coffin, the superintendent, and about 25 men are employed. The shaft has reached a depth of 400 feet, the ledge being of good size and fair quality. Drifting is in progress at the 300 levels, north and south, a long length of stoping ground being in readiness for the mill when it starts. A new ten-stamp mill (ten more stamps can be added at any time) has been erected, and when it is in operation it will give employment to a large number of men. The prospects of the Electric are very flattering.

The large circulation which the PRESS enjoys in every mining district throughout the coast has induced me to

utilize a little space for the purpose of warning miners not to come to this city at the present time. While it is true that Grass Valley is enjoying an era of unprecedented prosperity, and that it is to-day the most extensive mining camp in California, it is also true that the city possesses her quota of unemployed. Since the suspension of the silver mines men have been flocking here from every point and in every conceivable manner. The supply of labor has been far greater than the demand, consequently our streets are dotted with idle men. The percentage of idle men is probably greater than at any time in the history of the city, and to prevent others from still further swelling the number this note of warning is given.

Grass Valley, April 25, 1894.

SAMUEL BUTLER.

Of Practical Value.

Mr. A. S. Hallidie, president of the Mechanics' Institute of this city, recently delivered an address at the annual meeting of that body, which is replete with sound sense and practical suggestions. In the course of his remarks he touched upon the topics of local industries, manual labor, and trade schools, and spoke as follows:

The employment of men at a fair rate of wages is the solution to the hard times we have been experiencing. The Mechanics' Institute recognizes this, and emphasized it by the reception tendered to the Union Iron Works. I do not think that the importance of this fact has impressed itself on the people of San Francisco, yet for the last three months large sums of money have been raised to give work to the unemployed, and it has been seen how willing the majority of men are to earn, rather than to beg, their bread. If the lesson of the present condition of affairs can be made effective in this community, the money spent in thus enabling so many men to earn their bread will be well invested. Sufficient encouragement has not been extended to the local industries, and many have been driven from this city through the indifference of the people, who have failed to recognize the fact that, by giving preference to goods manufactured and produced by local industries, they keep the men and women of the city remuneratively employed, both to the benefit of themselves and the taxpayers; in fact, the citizens of San Francisco could better afford to maintain industrial establishments at a small percentage of loss, if by so doing they keep the deserving and industrious employed. And again, in view of conditions that exist in San Francisco, it shows a cruel indifference of the present wants of the people, and future prospects of the community, by encouraging importation of goods from the Eastern States and from foreign nations, to the distinct detriment and damage of our home industry.

The unhealthy condition of the average mind of this country, which looks with disdain upon manual labor, especially when it soils the hands or smuts the face, and the total disregard for the good of humanity in educating young men and women to thus regard labor, has overcrowded the professions, and proportionately degraded them. In the economic distribution of occupations but a small proportion can live by their wits; the great mass must now and in the future, as they have in the past, earn their living by the sweat of their brow. The skilled workmen in American workshops to-day are almost entirely foreigners, and to them is paid the higher compensation which should go to our own citizens.

Much has been done by philanthropic men in founding technical manual training and trade schools, but the aim has been too high for the benefit of the masses. Excellent superintendents, chemists, engineers and architects have been produced there, but the skilled mechanic, as such, has been almost entirely neglected. To reach such as are of mediocre talent, or not blessed with means, should be the main purpose of the manual training or trade school of the future; gather in and direct the physical energy of the young men and women so that, with the merest rudiments of a common school education, they can earn a living in an honest way, by the exercise of well-developed skill in some honorable handicraft, and educate the American-born mechanic to become the most skillful artisan among the artisans of the world. I believe the drift of opinion of those who are able to give and have seriously considered the situation as it really exists, is tending in that direction. James Lick, I think, in founding the California School of Mechanical Arts with \$540,000, and J. C. Wilmerding, who founded the Wilmerding School with \$400,000, had such an object in view. James Lick used these words in his will: "To educate males and females in the practical arts of life, such as workers in wood, iron and stone, or any of the metals, and in whatever industry intelligent skill now is or can hereafter be applied." And Mr. Wilmerding uses in his will the following language: "To teach boys trades fitting them to make a living with their hands with little study and plenty of work." The teaching of trades by school instruction confined to a particular trade, as in the old apprenticeship system, can scarcely be economic-

ally administered now, and a broader line of instruction is demanded by the modified conditions of industrial pursuits. Machinery has relieved the artisan of a great deal of mechanical labor, and such work capable of being done by a machine is unworthy the labor of man. The intelligent use of tools, tools being man's agent as man is God's agent, should be prized by every boy, and, in a limited way by every girl, and should be esteemed as a privilege. To teach the proper use of tools, so that such can be utilized in industrial pursuits, and can enable the artisan to make a living through his own labor, is the function of a trade school. The instruction here given to a pupil should have for its primary purposes the encouragement of industry, the means of making a living through some industrial pursuit, and the instillation of truth and honesty; and such instructions should be limited in the class room to the mere rudiments, but leading to the technical schools, by those who are competent and desire to go there, the technical schools bearing about the same relation to the trade school as the high school bears to the grammar; but the trade schools should admit pupils at as early an age as apprentices were indentured. It is probable that with three years, or four, grounding in the general use of tools, accompanied by necessary collateral class-room instructions, that the pupil should decide what calling he intends to follow, and then special instructions should be given in such calling, so as to fit him for the vocation he has chosen. Thorough, complete and concrete work should be done in the school; and if it is intended finally to launch the pupil into the world as an artisan, and not a jack-of-all trades, he is entitled to the same special instruction as a post-graduate or a collegiate taking a special course. The amount of good done by the manual training and technical schools cannot be fully recognized except by comparing the status to-day of the American engineer, among the engineers of the civilized world, with what it was thirty years ago; and it is to be hoped that within the next few years, in making the native American mechanic an artisan, he will occupy relatively the same proud position, and when it is remembered that the number of mechanics, as compared with the number of engineers, superintendents, etc., must be as thirty to one, it is a result most sincerely to be desired, both from the social and economic view.

The Nicaragua Canal.

There are many signs that the Nicaraguan canal project is growing in public favor. The popular feeling is manifest in the fact that scarcely any sort of public convention—political, social or other—is held nowadays without adopting resolutions calling upon the Government to take up the work and carry it out. All the political conventions of the year have so resolved; all the representative bodies of this coast have so resolved, and now social organizations like the Grange are joining in the movement. Senator Morgan of Alabama, the chief promoter of the project in the political world, has just made a report on the bill now before Congress, which puts the matter in the light of a simple business proposition. The present company, Mr. Morgan explains, has a valuable franchise and has expended several millions of dollars in preliminary work. If abandoned, this will be wasted or pass into foreign hands. The pending measure gives the Government absolute control of the canal, through ownership of seven-tenths of the stock. The work can be completed for less than \$90,000,000. Finished, it will earn enough at \$1 per ton charge on shipping (half the tolls on the Suez canal) \$4,000,000 per year, after paying operating expenses and interest on bonds. This is four per cent on the entire issue of stock, of which the United States will hold \$70,000,000. There is only one objection to this bill, namely: that it does not make the Government sole owner of the canal. There is no reason and there can be no possible advantage in a partnership arrangement with a private company even though the Government have a majority of the stock. It will only make a lot of "insiders" who will contrive ways to get contracts, etc., for their own advantage. The thing ought to be gotten wholly into the hands of the Government by fair and legitimate purchase of all interest or title, and then it should be promoted wholly as a national enterprise. There is, we are aware, some technical objection to nominal governmental ownership of the canal, but it is a mere lawyer's objection, without force in morals or in the spirit of things. In common sense there can be no objection to sole ownership that will not equally apply to seven-eighths ownership; and it is silly to quibble about it. The necessity for Government ownership is of a sort which must override outworn and obsolete laws and create new laws to fit the case.

The Government ought and must build the canal, and the conditions can never be more favorable than now. Money can be gotten at cheap rates; there are multitudes of men who need employment. As Senator Morgan puts

it, "inauguration of this work would be the greatest possible relief to the depressed and desperate laboring classes. It would benefit those who stay at home as well as those who go to Central America. It would relieve communities of the burden of care for thousands of unemployed, and put an end to the destructive competition for work which depresses wages and handicaps labor of every kind. No wiser measure in interest of the working classes could be conceived. If these understood their interest, mass meetings would agitate for the canal bill, and petitions would pour into Congress in its favor. It is a means of public relief as well as of national progress and commercial extension."

Lessening Demand for Horses.

The following is from an address by Hon. F. A. Derthick, Mantua, O., before the students of the Ohio State University:

The breeding of horses has heretofore been a profitable feature of agriculture, and its demoralization is no doubt an important contributor to the depression that is said to overshadow the vocation of the farmer. If our surplus horses could be disposed of, as in former times, it would relieve the stringency felt upon most farms, in two ways: First, by the money received for the horses, and, second, by the release of thousands of tons of hay and grain now held to feed to unprofitable stock. It is impossible, however, to dispose of any but the more desirable animals, and these at prices greatly reduced.

The Great Depression.—This change is due to several causes, among which can be numbered the general depression in business circles. There are, however, causes that will not be removed by a return of business prosperity. First, the quite general introduction of cable and electric cars within the past five years. Within this time the demand for horses for the street-car service has practically ceased. The influence of this alone can hardly be estimated. The life of the street-car horse was exhaustive and therefore brief, and to supply his place gave a steadiness to the horse market. The change in the motive power of street cars not only cut off the demand, but the thousands of horses already in use, now no longer needed, have found their way back into the country.

Electricity.—Nor is the end yet. The road commission appointed by the Governor last winter to investigate the subject of improving our public highways is quite likely to report adversely to the use of stone and gravel in the construction of free turnpikes on the more important roads. A part of the membership of this board is known to favor the use of steel rails. The plan is that important roads shall be traversed by electric cars, which will not only transport passengers at frequent intervals, but also with night trains haul produce to market. It would be folly to predict failure for this plan, for already suburban trains are run between adjoining cities, and roads are in process of construction in many parts of the State. There seems to be no limit to the skill and inventive genius of man, and the day may not be far distant when the services of horses may be dispensed with in ordinary country travel. It is insisted that it is not a question of possibility, but—"how soon" we shall be able to connect our individual trolley with the public electric wire and bowl across the country independent of horses. Who shall say that in the near future the young man, with his carriage equipped with a storage battery, may not go for a ride with his best girl, in which event the material for "a spark" would be an un-failing accompaniment?

Bicycles and Wings.—The advent of the bicycle has also contributed to the general slaughter of price and demand for horses. Large numbers of men and women who, until recently, kept a horse each, either for pleasure or business, have purchased a wheel and disposed of the horses. Again, I notice that on the 18th of November last, the first canal boat in the world to be propelled by electricity plowed the waters of the Erie canal. It is expected that at an expense of 50 cents per day per boat for electricity furnished by Niagara Falls, a boat will be sent from Buffalo to New York in much less time than at present, and with no outlay for driver, hay, oats or horseflesh. It would not be so bad if this were all. Did you notice the report of the international meeting of scientists held at Chicago during the World's Fair, and that they discussed in all seriousness the question of a flying machine? Ten years ago this body would have ridiculed the idea, but to-day these learned and dignified men declare, in all seeming sincerity, that the time is coming, and early too, when men will fly where and when they please, and from dizzy heights look down upon those of us who conduct ourselves with the snail-like pace of the old-fashioned horse. You will admit that a good part of this review recounts facts accomplished. A part, it is true, is speculation, but who dare say that is conversant with the development of the last decade, that it will not be realized in the decade to come?

The Production of Artificial Rain.

By B. S. Pague, Forecast Official U. S. Weather Bureau,
In arid or semi-arid regions the subject of rainfall in connection with crop production is a most important one. The question of what is the least amount of rain that is necessary to produce crops has been frequently argued, but this one fact can be relied upon: Good crops on other than adobe soil can be raised with ten inches of rainfall, if the rainfall is properly distributed and the temperature conditions favorable. With unfavorable temperature conditions at the time the stem of the product is full of sap, 40 inches of annual rainfall will not assure good crops. In California the autumn rains begin in October, and by December 1st the soil in all parts of the State is in condition to plow and seed. The rains of December, January and February are usually sufficient, even in the phenomenal dry years, to cause the seed to sprout and the grain to grow. Statistics bear out the assertion that it is upon the rainfall of March, April and May that the crops of California depend. The largest crop ever produced in the State was in 1880, when in April the rainfall was the heaviest on record. The years of great drouth in California and consequent short crops were in 1851, 1864 and 1877. As the State is developed the necessity for irrigation is more apparent, and more irrigation is practiced year by year, so that the same percentage of deficiency in the total product will not prevail that did prevail in former years of deficient rainfall. The following statement shows how the rainfall this season compares with the average:

PLACES.	Total for Season to date.	Average Seasonal to date.	Average Seasonal July 1 to June 30.	Percentage of Deficiency for Season to date.
San Francisco.....	16.10	20.88	23.93	23%
Red Bluff.....	19.15	22.23	26.66	13%
Sacramento.....	13.85	16.91	16.53	18%
Fresno.....	6.17	9.93	9.27	25%
Los Angeles.....	6.40	16.15	13.22	60%
San Diego.....	4.76	9.88	11.16	52%

In the season of 1876-77 the total rainfall at Los Angeles amounted to 5.28 inches, at San Francisco to 10.00 inches and at Sacramento 8.96 inches. In 1863-64 the total at San Francisco amounted to 10.08 inches, at Sacramento 7.87 inches, while for the least seasonal rainfall on record, in 1850-51, at San Francisco 7.40 inches and at Sacramento 4.71 inches fell. In a period of 45 years there have been three seasons of drouth in California, and in addition several years of markedly deficient rainfall when vegetation suffered and crops were short for lack of rainfall.

A popular fallacy exists that after all great battles heavy rain fell and that the rainfall was due to cannonading. This fallacy took such a strong hold of some that Congress was induced to make an appropriation to determine whether rain could be produced by the use of explosives. The experiments were conducted in 1891 in Texas, under the charge of the Forestry Division of the Agricultural Department. The official report on the subject, made by the meteorologist who accompanied the expedition, contained the following: "These experiments have not afforded any scientific standing in the theory that rain storms can be produced by concussion."

When the expedition reached Midland, Texas, some experiments were made to test the material composing the rackarock. No results were expected from the tests, but the following afternoon considerable rain fell. An employee of the expedition took upon himself the sending of the following message: "Fired some explosive yesterday afternoon; raining hard to-day." This first telegraphic report was followed by others. As the actual operation and result have become known, the attitude of the newspapers became changed from unsuspecting and ready acceptance to satire and ridicule. Where millions saw the dispatches, only hundreds have read a detailed account of the exact facts, and a vast number of people still believe that the experiments were in some degree successful, and that concussion, when made for the purpose, will produce rain. So errors which will require years of teaching to eradicate have been sown broadcast in a single summer, and the rain-making myth is added to the numerous errors about the weather which already prevail.

Rain-makers are now at work in this State, especially in those sections where the deficient rainfall is most noticeable in its effect on crops. Mr. Edgar B. Davison of Ballard, Santa Barbara county, writes this office under date of April 5, 1894: "Would you kindly inform me as to the possibilities of causing rain by artificial means. We all know that during the Harrison administration experiments were made on the production of rain, but the newspaper reports were so conflicting as to be entirely unsatisfactory. Were these experiments as complete failures as some authorities would have us think? We have the prospect of a dry season staring us in the face, and there is some talk of 'rain experiments.' Will you kindly give me your opinion on the matter?"

This is in answer to Mr. Davison's letter: For example,

suppose you take a cubic mile of air, upon which operations were made in Texas on the night of Friday, November 25, 1892. The record shows the temperature of the air as 72°; the dew point as 31°. To cool down a cubic mile of that air to the dew point would require the abstraction of as much heat as would raise 88,000 tons of water from the freezing point to the boiling point. To cool it down another 11° would require as much more heat to be abstracted. The amount of water set free would be 20,000 tons, which spread over a square mile would give about 1.4 pounds per

some divine power in this way cleanses the earth or that the vapor from the blood steams forth and makes moisture fall. If from a great heat a large body of air is made to ascend in a column, a large cloud will be generated and that cloud will contain in itself a self-sustaining power which may move from the place over which it has formed and cause the air over which it passes to rise up into it and thus form cloud and rain, until the rain may become more general. This is in theory, but the records of great fires do not show that rain has been caused by them. Relative to explosions

words, when the conditions are favorable for rain explosives and fires may precipitate rain, but when the air is too dry no artificial means can cause rain to fall. Legitimate scientific investigation for the production of rain should be encouraged, but the experiments should first be carried on in the physical laboratory before attempting them upon nature's great physical laboratory.

San Francisco, Cal., April 11, 1894.

AND NOW comes the "Prune Horse," which won the



THE PRUNE HORSE—A FEATURE OF THE SANTA CLARA EXHIBIT AT THE MIDWINTER FAIR.

square foot, or 0.27 of an inch of rainfall. The amount of latent heat set free by the condensation of that amount of water would raise 100,000 tons of water from the freezing point to the boiling point, and it would be necessary to abstract this heat in order that the rain-making might go on. The foregoing is on the presumption that the cubic mile of air be kept constant; if the air operated on is constantly changing, the task becomes one of infinitely greater difficulty.

Two causes of artificial rain have been suggested—explosion and fire. The belief that battles occasion rain is older than the invention of gunpowder, for Plutarch, in a sentence often quoted, says: "It is a matter of current observation that extraordinary rains pretty generally fall after great battles." And he explains this by supposing that

or concussions, it appears probable that on the southeast quadrant of a storm, the region of greatest moisture, if no rain should fall, though it threatened, that great concussions to cause a disturbance of the water particles held in suspension would produce rainfall. The Texas experiments were made without attempting to produce rain when the conditions were favorable for rain; but, under any and all conditions, the attempt was made, with the result a practical failure, though in a few instances a few drops of rain fell.

It may be stated in conclusion that, admitting that explosives and fires have in some few cases determined rainfall, they can only do so when moisture is present in sufficient quantity in the air, and when the other conditions, such as temperature and wind, are favorable. In other

first heat at Chicago, and is now in for the second at the Sunset City. This animal has doubtless surprised even his breeders in the way he gets over the ground of popularity. It is claimed that he did more to advertise the prune product of Santa Clara county at the World's Fair than any other more dignified display could have possibly done.

The prune horse was "one of the things to see" all through the Chicago season. So notable an affair should be seen in the Santa Clara building by all who go to the Midwinter Fair. The engraving gives the main points of his composition and environment. Horse and rider have consumed in construction 510 pounds of prunes and 80 pounds of other fruits. In his occasional grooming additional amounts are employed.

Mechanical Progress.

Compressed Air vs. Hydraulic Power.

After many years of experience the system of hydraulic transmission has been carried to a high degree of perfection, and the conditions of success are well understood. To transmit power economically and efficiently by water a very high pressure must be adopted, with a moderate velocity in the mains. This moderate velocity in the mains is dictated not only by considerations of friction, but also, more imperatively, by the necessity of limiting the stresses due to the inertia of the incompressible mass of water in the mains when the velocity changes. The whole mass of water in the mains must change velocity simultaneously, hence the shocks due to sudden changes of velocity are very serious. Both the high pressure and the low velocity limit the size of mains which can be used, and, therefore, the amount of power which can be transmitted.

Systems for transmitting power by compressed air are not yet so completely worked out, nor are the conditions of economy and efficiency so well understood. The unavoidable heating losses in compression limit the pressure which can be used in air transmission, and it is doubtful if in any case efficiencies quite so great as those attained with water can be realized with air. Nevertheless, there are cases where the moderate pressures used in air transmission are far more convenient than the high pressures required for water transmission, and there appears to be no definite limit to the size of the main which can be used or the amount of power which can be transmitted, if necessary, by air. For three reasons the velocity of flow in the mains may be very much greater with air than with water. The friction in the mains is less with air than with water in the ratio of their densities. The frictional work is less an evil with air than with water, because part of that frictional work is recoverable. Lastly, the elasticity and small density of the air make the danger of shocks or inertia stresses practically vanish. Water can only afford work less than the produce of its pressure and volume, but air used expansively gives an amount of work greater than the product of its pressure and volume; hence it turns out that with a given size of main a considerably greater amount of power can be transmitted with air of moderate pressure than with water of very great pressure.

Hardening Plaster.

The French, who have carried the art of hardening plaster to where it is utilized for flooring, either in place of wood or tile, use six parts of good quality of plaster intimately mixed with one part of freshly slacked lime, finely sifted. This mixture is then laid down as quickly as possible, care being taken that the trowel is not used on it for too long a time. The floor is then allowed to become very dry, and afterward thoroughly saturated with the sulphate of iron or zinc, the iron giving the strongest surface, the resistance to breakage being 20 times the strength of ordinary plaster. With sulphate of zinc the floor remains white, but when iron is used it becomes the color of rusted iron; but if linseed oil, boiled with litharge, be applied to the surface, it becomes of a beautiful mahogany color. Especially is this the case if a coat of copal varnish is added.

THE Chicago & Northwestern mechanical department is using a soda compound to soften the feed water, and it is reported to give very satisfactory results. The mixture is similar to that employed by the Chicago, Milwaukee & St. Paul, the recipe for which was prepared by Mr. George Gibbs, the mechanical engineer. The use of this mixture appears to be a very profitable investment, for it keeps the heating surface fairly clean,

reduces thereby the amount of boiler work to be done, keeps the engines longer in service between the periods of going in for repairs, and saves enough fuel to pay the expense of the compound.

A Strange Break.

At the Scranton shops of the Delaware, Lackawana and Western railroad there were recently made some tests of wire rope and fastenings for it. One and a half-inch steel cables are used in some of their mines, and these tests were made to determine whether or not the fastenings were as strong as the cables. Sockets with taper holes, known as rope cones, to receive the rope, and ending in a fork to fasten to the cage, are used. The rope is passed through the hole and the ends of the wires turned back, making a bushy head. Into this mass of twisted and doubled wire they pour lead or babbit metal.

The pieces are tested in their regular wheel press. It was soon proved that the rope was amply strong, sustaining 70 tons with no other effect than a reduction of diameter owing to the compression of the soft center. Lead proved very soft for fastening the wires—they pulled through it. A composition of three parts lead to one part antimony did far better.

The forks sustained load enough to bend steel pins two inches in diameter before breaking, but when they did break a curious thing happened—one side of the fork broke in two places, and a piece about an inch long dropped on the floor. This happened when the load was about 70 tons.

The cross section of the metal was the same where each break occurred—but why should two occur?

PAPER COGS for gearing have been proposed by an audacious inventor. They would be made in connection with sections of framework to go outside an iron wheel. Lightness would thus be secured, but, more than that, a certain elasticity where there is a sudden jerk of the shafting would result. In such emergencies iron cogs are sometimes stripped off and the machinery is paralyzed for days while waiting for repairs.

BESIDES having pneumatic tires for bicycles, they make pneumatic hubs in England. These are said to promise increased speed, although the invention is not yet perfect.

Mining an Underground Forest.

The working of a mine the product of which is timber is an operation not to be seen every day, but a noteworthy mine of this sort is to be seen in Tongking, where in a formation of sand, at a depth of from 14 to 20 feet, a deposit, tolerably thick, of the stems of trees, which, thousands of years ago, must have existed as an extensive forest, but eventually became buried by an earthquake or other similar phenomenon, and has been opened and is now being mined through gangways.

The timber in no way forms any kind of coal, but is in good condition, a fact to be attributed to the large proportion of resin which it contains, and the sandy nature of the ground in which it lies. The Chinese work the mine methodically, and use the timber chiefly for sculptural purposes, coffins, troughs, etc.

The stems have a diameter of a yard, are 45 feet long and appear to be a kind of fir very similar to pitch pine.

A BILL permitting the construction of an elevated electric railway between Washington and New York has been introduced in the House by Congressman Catchings, of Mississippi. It is designed to run trains at the rate of 150 miles an hour over this road. The company is to be capitalized at \$15,000,000, and the charge for transporting passengers is not to exceed two cents per mile.

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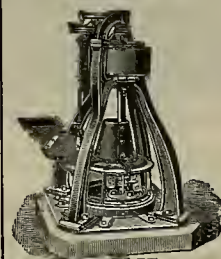
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Scientific Progress.

Scientific Uses of Liquid Air.

Prof. Dewar has been lecturing in London on the scientific uses of liquid air. It has to be prepared and preserved at a temperature of 200° below zero. He showed the substance in large quantities. In his improved methods it is not preserved in a liquid or solid state by its own evaporation, but by having the heat of surrounding bodies completely screened off. The liquid oxygen is placed in a vacuum jacket which is immersed in liquid oxygen contained in a second vacuum jacket and connected to an air pump. Convection is annihilated by a vacuum which must be all but absolute, and conduction is shut out by the surrounding oxygen, and radiation seems to be infinitesimally small. With such oxygen experiments can be made for the determination of its specific and latent heat. A definite mass of platinum can be lowered into the liquid, and the gas evolved is easily calculated, and the heat that becomes latent in converting the liquid into a gas is measured. One of the most interesting experiments is that which illustrates the difficulty of an electrical discharge where there is little or no ponderable matter. A bulb containing a mercury vacuum is plunged in liquid oxygen at 200° below zero, and the remaining mercury is condensed, after which an electrical discharge through the vacuum is possible only by enormously increasing the voltage, when the discharge assumes a totally different form, the diffused phosphorescence giving place to luminous streaks. It would seem, therefore, that after a certain degree of rarefaction has been attained, the gaseous molecules are no longer sufficient in number to act as carriers for an ordinary charge, while a more powerful one bridges the space only by the aid of the few that remain. The result almost justifies the presumption that ponderable matter is always necessary for the passage of electricity through space, but at the same time it opens up the question whether space can ever be wholly free of ponderable matter. If a certain amount of vapor be still given off by mercury at 140° below its freezing point, to what temperature below minus 274° must we suppose hydrogen to be cooled in order to insure that no residuum shall remain in the gaseous form? Another experiment showed that in extreme cold the metals have their cohesion greatly increased. It also appeared that a magnet which has not been super-saturated has its magnetic activity markedly increased by a reduction of temperature. This increase of cohesion and magnetic force at very low temperature is to be considered in relation to the disappearance of electrical resistance in pure metals.—N. Y. Independent.

Glaciation of Brazil.

One of the results of the lively interest which geologists just now take in glacial phenomena is a timely paper by Professor Branner on the supposed glaciation of Brazil, says Geo. F. Becker in *Cosmopolitan*. There is no known evidence which will bear close examination that there ever was any general glaciation in that torrid land, yet erratic boulders and glacial till are so closely simulated as temporarily to have deceived observers of the highest order of competency. These misleading phenomena are common in regions where glaciation has prevailed as well as in the tropics; and they deserve the closest attention, since in high latitudes the hypothesis of glacial origin is more likely to pass unchallenged than it is at the equator. Fairly homogeneous solid rocks, like granite, are usually intersected by cracks dividing the mass into blocks of varying sizes. If such rocks are exposed to the decomposing action of the weather, the smallest blocks disintegrate most rapidly, because their surfaces are greater in pro-

portion to their volume. As for the large blocks, their corners and edges yield more rapidly than their flatter surfaces for a very similar reason, viz., that the surface exposed per unit of volume is greatest at salient points. The result often is that a dike or boss of rock is reduced to a small number of isolated, rounded lumps which closely resemble erratics. This resemblance is not strange when one considers that in water-wearing also salient points are the first to suffer.

The masses of clay mixed with sub-angular stones, which were mistaken for glacial till in Brazil, Mr. Branner refers, no doubt correctly, to land-slides. Such land-slides sometimes, in northern latitudes at any rate, even simulate moraines when they happen to have dammed a ravine, and the mutual attrition of stones in a landslide adds to the deceptive resemblance. Now, glacial till is surface material which has been plowed up and worked over by the force of advancing ice, while land-slides consist of superficial earth and rock disturbed and mingled by the force of gravity. Thus the mechanical origin of each is extremely similar; there is no cause for wonder that they have sometimes been confounded, and the greatest care should be exercised in discriminating them in regions where either is geologically possible.

The Original Americans.

It is possible, according to recent scientific researches, that the people from whom, in the opinion of some investigators, the name of America was derived were originally inhabitants of the Polynesian Islands. Ages ago, it is believed, a nearly complete land connection existed between those islands and Central America, the Pacific ocean being at that time almost bridged with a chain of islands.

The tribe of Indians afterward known as the Ameriques are supposed, from certain remains, to have first taken possession of an island, Momotombito, near the western edge of Nicaragua, where they left some very interesting carvings and other tokens of their skill.

Afterward, according to the theory, a subsidence of the land occurred which drove them eastward until they came to the fertile slopes of the Amerique mountains, where their descendants are still to be found. It has been suggested that Vesputius got his pseudonym of "Amerigo" from the name of this tribe of Indians.

If all these things are true, it might be pointed out that even geological convulsions have played a part in the long series of events leading up, as if in obedience to a decree of Providence, to the naming of the new world, not Columbia, but America.

Aluminum for Flash Lights.

The use of aluminum as a substitute for magnesium for the production of flash light is growing in favor among photographers. Its chief advantages are its higher activity and its freedom from objectionable odors on ignition. The commercial aluminum bronze powder can be used if all the grease be removed by the application of heat. The consequence of allowing the grease to remain is that the powder adheres in lumps, and a large proportion of it escapes ignition when blown through the flame. Another advantage possessed by aluminum over magnesium is its resistance to oxidation when in fine powder. The mixture recommended by Prof. Glasenapp for photographic work is composed of: Aluminum powder, 21.7 parts by weight; sulphide of antimony, 13.8 parts by weight. In preparing the mixture the same precautions must be taken as with magnesium.

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Electric Progress.

Tesla's Experiments.

It is not all an extravagant statement to say that never before in the history of the world has there been a scientific discovery about which centered such magnificent dreams as there are being built up on certain recently discovered electrical principles. Among these the foremost must be given to the astounding discoveries of the young Servian genius, Nikola Tesla, which are so novel and so extraordinary that the most imaginative of inventors are unable to foresee what form their development will take. Just as experimenters were beginning to think that they knew all that could be learned about electricity, and that further improvements must be in the line of more perfect mechanical application, Mr. Tesla shows us the electric fluid under conditions in which it differs from ordinary electricity as much as light differs from heat. A current of 2000 volts will kill a man in the twinkling of an eye, but this modern wizard lets currents pour through his hands with a potential of 200,000 volts, vibrating a million times a second and showering from him in dazzling streams of light. For some time after the experiment ceases his body and clothing emit streams and halos of splintered light.

The wildest dream of the inventor could not have foreseen that while currents of low frequency are deadly, these are harmless. Mr. Tesla says that he will soon be able to wrap himself in a complete sheet of electric fire that will keep a man warm at the North Pole without harming him. Neither Merlin nor Michael Scott nor any of the wizards of old ever wrought a more potent miracle, even in fancy. The meaning of this is too far beyond us to be realized at present. We can no more grasp the significance than Franklin could discern the electric motor in his captured thunderbolt. Equally astounding and with more visible usefulness is Mr. Tesla's discovery that currents of such enormous potential and frequency can be transmitted without the use of wires. A room can be filled with electricity from copper plates in ceiling and floor, so that the electric lamps will burn without any connecting wire as soon as they are brought in. In the same way intelligence and power may be transmitted without a circuit, doing away with necessity of trolleys, storage batteries and subways. When it is considered that such startling changes as this are already theoretically possible, it will be seen that in the inventions upon which we so complacently congratulate ourselves we have only just timidly paddled along the shore of the great sea yet to be explored.

Telephones for Local Uses.

The expiration, on January 30th, of the patent on the Bell metallic diaphragm telephone has developed a new field of usefulness for the telephone, and perhaps will entirely displace the speaking tube and electric bell annunciator. The cost of telephones for hotels and houses will probably not greatly exceed, if, indeed, they will not be cheaper, than the cost of speaking tubes or an electric annunciator service, while their convenience will be immensely greater. While the monopoly of the transmitter and switch-board devices, says the *Electrical World*, will prevent the residents of large cities from obtaining much benefit from the expiration of the patent referred to, farmers and residents of small towns, on the other hand, will obtain full advantage. They will be enabled to run short lines to their stables, places of business, or elsewhere, and in small towns it would seem to be possible to also have exchanges, as the necessary devices will be simple, and can be selected and used so as to avoid switch-board patents. In fact, several such exchange

systems are already in a state to put on the market with guarantees that they constitute no infringement on existing patents. There will be no scarcity of instruments, as, besides the firms who have prepared for that contingency, there are great numbers of telephones made for companies that were afterward declared infringers, and which have been stored to await the opportunity to place them on the market.

Coal Used in Producing Electricity.

The National Electric Light Association is making endeavors to determine the amount of coal used in actual practice in the United States to produce a given quantity of electricity. At a recent meeting of the association in Washington, D. C., some data which was procured through correspondence was presented. In this data the number of amperes, volts and hours on each circuit was considered in connection with the actual amount of coal consumed during the same period of time, including that used for banking fires. In this way the actual number of watt hours per pound of coal was arrived at in each case.

The results were at wide variance, but the rest of them cannot be said to compare very favorably with the results which have been reached in the generation of power for manufacturing purposes. The average of watt hours per pound of coal was found to be 91.7. The most satisfactory result was that in a large station generating about 8,000,000 watts and running 24 hours per day, which gave 208 watt hours per pound of hard screenings, while the opposite extreme was reached in the case of a station which claimed only 30 watt hours per pound of soft coal, the output being 30,000 watts and the service seven hours per day.

For purpose of comparison, experiments were made with the engines in a large manufactory in Brooklyn, N. Y. Upon these engines a load varying from 495 to 765 indicated horse power, averaging 653.3 horse power, was maintained with a coal consumption of 1482 pounds per indicated horse power per hour. The equipment consisted of Corliss compound condensing engines and vertical tubular boilers, which were in operation ten hours per day. The fuel used was George's Creek bituminous coal. The efficiency of this plant, therefore, is nearly double that of the best electric plant reported and about 13 times that of the worst one.

THE Koenigsberg Electricity Works is a station which is of considerable interest among German stations, and is remarkable chiefly for two features; its circuits are on the five wire system, and the mains are laid in conduits. The engines are of triple-expansion vertical type, and by Schichau of Elbing. There are two of 200-horse power and two of 100-horse power; they run at 200 revolutions a minute, and are directly coupled each to two multipolar dynamos, which have the outside wires of their disc armatures arranged as commutators. Very full descriptions are given in the columns of a German electrical journal of the circuits of the five-wire supply and also of the conduit in which the five conductors of bare copper strip are carried on insulators of the telegraph type. These mains are calculated for 60,000 lamps, but the present station can only supply 16,000. All details given are very full, and the financial results, in spite of the disproportionately heavy outlay on mains, are stated to be satisfactory.

THE original 1858 cable weighed 93 pounds per mile, and had a conductor of seven copper wires of 22½ gauge. Price of deep sea wire per mile, \$200; price of spun yarn and iron wire per mile, \$265; cost of outside coating of tar and gutta percha, \$25 per mile; total cost per mile, \$485. At \$485 per mile, the total cost of the 2500 miles of deep sea wire was \$1,212,500. To

this add 25 miles of "shore-end" wire, costing \$1450 per mile, and we find that the first ocean cable, exclusive of instruments, cost \$1,250,000.

Electric Wire Perils.

I believe that the peril from electricity in all its varied applications is diminishing, in consequence of the rapid increase of knowledge of the subject. The greatest danger results from the fact that most people are ignorant of its powers and the proper safeguards. This ignorance, at the same time, causes them to be unnecessarily alarmed. Another important element of danger from this force is that its effects are instantaneous, and that there is no means of warning before any given trouble occurs.

In the case of being burned, for example, heat is usually felt before the burning point is reached; but this is not the case with electricity. The safeguards against all electrical accidents, on the other hand, are extremely simple and reliable, and I believe that in a few years the subject will be so thoroughly understood by every one that electricity will be much safer and more easily handled by all than any other force.

There is an erroneous popular impression that many fires are caused by electric-light wires, but the statistics show that this is not the case; but, on the contrary, fires from electric-light wires are very rare. It is at present the custom to ascribe all fires in buildings where there are any wires to electricity, without regard to any evidence to show that the fire was so caused.

In regard to the recent alleged case of hysterical blindness, I believe that it is purely a "fake."—Dr. Schuyler S. Wheeler.

ON one of the Canadian lakes there is the only electrically driven sleigh in the world. The driver sits on a motor that works a couple of steel paddle wheels, and guides with a couple of rudders extending out and engaging in the ice behind.

Practical Information.

Pay Attention.

Whatever you are about, pay attention to it. Keep your mind on what you are at. Think of what you are doing. Close attention is very much a matter of habit; and it is a habit which should be diligently cultivated.

Take, for instance, the habit of mind in reading. One law student has a general idea that he has seen a case reported somewhere, in which he rather believes a certain point arose—he is not quite sure of that—which was decided one way or the other, he don't remember which! Another student, who had the same book in his hand the same length of time, remembers what reports it was in, the number of the volume, the name of the case, the names of the counsel, the points that came up, the views of the different judges, if there was a conflict of opinion upon them, and precisely what the decision was. He even remembers the part of the book, the very number of the page where it is to be found. In his mind's eye he can see the lines, the words, the letters. He has the habit of fixed attention, which all students should strive to acquire.

The opposite extreme of loose reading and listening is illustrated by some amusing anecdotes. One is of a man who said he had recently read in some paper, he couldn't remember where it was, of a man named Johnson—he believed his name was Johnson—who had raised a thousand barrels of potatoes to the acre—he believed it was barrels, it might possibly have been bushels; he was quite sure it was potatoes, thought possibly it might have been apples; it seemed a good deal for an acre, he might be mistaken about that—really it was impossible, it must have been more than an acre!

Another is of an old woman who said she

had learned a sure way to tell whether an egg was good or not; she had heard of a great many before, but this was certain, and it was so simple, too; it was to just drop the egg into a pail of water, and if it was good it would—either sink or swim, she really had forgotten which.

It is a very good practice after laying a book down to take up a pen and see how much you can write of what you have read. After trying it regularly for a week you will be pleased to find how much more you can remember than you could at first, so rapidly does the habit of concentrating one's thoughts grow with cultivation.

Think of what you are doing and you will remember what you have done. Cultivate the habit of keeping wide awake and of fixing your attention closely.

Bartissol's Panama Canal Scheme.

There does not appear to be any prospect that work on the Panama canal will be resumed very soon; but two or three features of M. Bartissol's scheme for finishing that famous job, as described in *La Revue Technique*, are interesting from an engineering point of view, and deserve mention. The old plan contemplates several levels and from eight to ten locks, between 122 and 175 feet above the sea. But M. Bartissol would get along with four locks, two at each end of a central level only 75 feet above the ocean.

As will quickly be perceived, this change of programme involves an increased amount of rock and soil cutting. The most ingenious part of the new scheme provides for the disposition of the extra material thus excavated. Beside the canal, and running down into the Pacific, he would construct a 12-foot tunnel, nearly six miles (33,000 feet) long, through which the debris would be washed. Water for this purpose would be brought through an open channel from a dam on the Chagres river. The projector would allow about one foot fall to every 1000 feet of length, and have his current fill the tunnel to a height of about ten feet. A flow of ten feet per second, it is estimated, would be secured, and this would discharge 1,000,000 cubic meters daily. A hundred shafts, cut into this tunnel, would empty into it only about 40,000 cubic meters of solid masonry in 24 hours, according to M. Bartissol; so that only about four per cent of the discharged mixture would be earth or stone.

This method of removing debris has been tried, on a much smaller scale, at the isthmus and elsewhere; but enough is known to give the engineer who proposes this 13-foot conduit confidence in its feasibility. Four years of time and \$100,000,000 of money are all that is required, he thinks, to complete the work on the foregoing basis.

Two Projects.

There are two projects for the Simplon tunnel on the Jura-Simplon Railway. One of these, by M. Lommel, provides for a double line through the tunnel to horings to be undertaken at a height of 2200 feet above the level of the sea. The tunnel will be 11½ miles in length, and the cost is calculated at about £4,300,000. According to the second plan, the tunnel would be made at a somewhat lower level, and there would be only one line of rails. This would reduce the cost to about half of the amount mentioned, and the tunnel, it is calculated, could be completed in 5½ years. Both plans suffer from the drawback that there will be a rapid fall on the Italian side, about 1 in 42. It has been proposed to construct a shaft 1800 feet deep in the interior of the mountain to secure better conditions of temperature. The latter is an important point, as it is expected that the temperature in the interior of the mountain will be as much as 95 degrees Fahrenheit.

An Eastern Opinion.

The *Railway World*, published in Philadelphia, is one of the prominent Eastern journals that, in discussing the free-coinage question, shows that a good deal depends upon the point of view. In its issue of the 14th inst., in a long article on silver and current politics, it says:

Many Congressmen and not a few Senators who favor tariff reduction on merely partisan grounds are sincerely and enthusiastically in favor of silver. They will support a tariff bill if the leaders commit the party to such a measure, but care little about the tariff, and would, it may be, prefer that duty on local products should remain undisturbed. They are warmly in favor of silver as money, and their constituents believe that such money is a necessary step to the return of prosperity. On the other hand, there is a powerful gold influence strongly entrenched along the Atlantic seaboard. Extreme silver men insist that the President and those closely allied to him are gold monometallists. A controversy on this subject might enliven many days. With here and there a struggle over a nomination, it might be protracted until the majority was divided into wings irreconcilably hostile to each other. It might become patent to all men that the tariff bill could not pass without a free-coinage amendment. The attitude of the President leads one to suppose that he would rather see the existing law remain on the statute books than give his sanction to any free-coinage movement. Here is a chance of killing the bill, either by tacking it to death, or so amending it that the President will be constrained to return it without his approval.

It may, therefore, be anticipated that a silver discussion will be encouraged by protectionists who do not wish to see free coinage adopted. One may go further. If the only way to defeat tariff smashing is to pass a free-silver bill, let us have free silver. Of the alternatives, the latter is far preferable. Last summer brought countless assurances that the repeal of the purchase clause would be followed by a great wave of returning prosperity. The purchase clause was repealed, but the depression continued, and in some lines even intensified. Business was affected by the dread of tariff reduction. Factories closed because they had no orders. Purchasers held aloof because they might be able to buy at lower rates under a new tariff. Miners found that the demand for coal had slackened because industrial establishments were silent or running on half time. Railways did not order new cars because many of their old ones were idle, nor did they engage new employees when train hands after years of faithful service were necessarily dropped from the payroll. The knowledge that the Wilson bill had passed the lower branch of Congress, and that it found defections in the upper house, increased the dissatisfaction felt in business circles everywhere. Granting that the silver-purchase clause was objectionable, and that it should have been repealed, it was a molehill and tariff agitation was a mountain. If Wilson and his committee had been treated as they deserved—that is, if no member had spoken of the bill except in terms of bitterest contempt, and if the hybrid had been voted down by an overwhelming storm of votes—business would have revived long ago. The country can far better afford to buy a specified quantity of silver than it can afford to place its manufacturing interests in the hands of men who know nothing about them and slam the door when people of common sense endeavor to teach them something.

Nobody can reasonably argue that our present troubles are due to the silver-purchase clause or to the fact that silver dollars are in circulation. European financiers long wedded to the gold standard are beginning to investigate the subject. Great Britain and Germany are willing to admit

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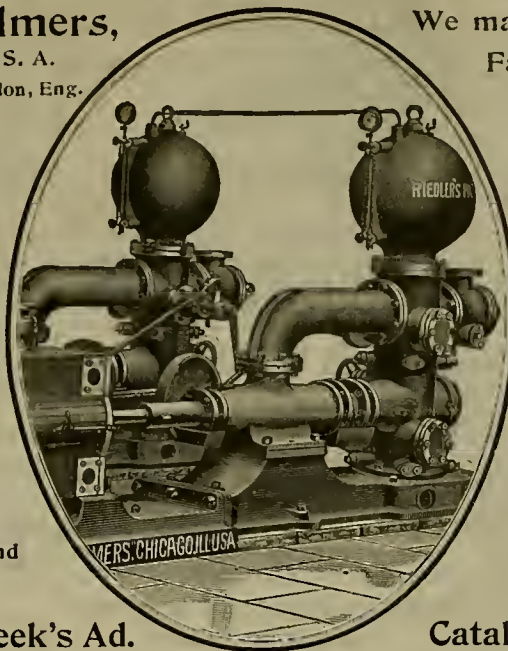
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that a bimetallic system is a possibility. Further concessions may be obtained. The use of silver as money far antedates what we call civilization, and the experience of ages is not to be discarded lightly. In many sections, gold coin is generally hoarded as soon as received, while the much-abused silver coin is kept in general circulation. A conviction that silver, as a great American interest, and as a precious metal from the days of Abraham to our own, demands recognition is certainly deeply rooted. The minority party in the United States Senate is as a unit in opposition to radical tariff legislation. Both parties have many friends of the white metal in their ranks. A bimetallic movement of some kind is to be anticipated. One may oppose free coinage, and yet hold that it is far less objectionable than a tariff which deprives us of protection and does not furnish revenue. If the people must choose between tariff smashing and free silver, it is to be hoped that the result will be free silver.

A New Gold Saving Process.

It is reported that an expert chemist at Denver is now successfully taking out 90 per cent of the assay value of gold from the various ores of Colorado and elsewhere. Capitalists and mine-owners are showing a deep interest in the practical development of his process, and the mining world at large will gladly hail any new chemical means of extraction from base or low-grade ore pulps which can be accomplished economically. A few years hence it is possible that the supply of gold will far exceed silver and that chemistry will solve the great problem, mechanism having reached its ultimatum of extraction.—Virginia Enterprise.

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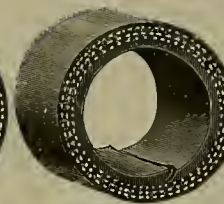
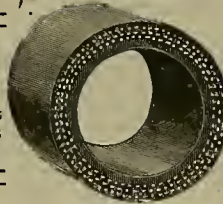
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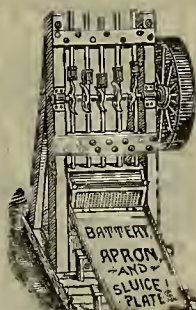
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From South Africa.

A letter from the Witwatersrand (South Africa) says: "In coming here one has to pay 4d per pound for all excess luggage over 50 pounds second class, or 25 pounds third class; second class is £8, third class £4 8s rod, and no sleeping accommodation in the latter. That is in the train after arrival at the Cape. One has to pay 6s 6d twice on revolvers, and a guinea twice on gun or rifle per barrel. This is a black man's country; all labor or menial work is done by them. Smallpox and fever are the prevailing sicknesses. There are 30,000 black men employed on the mines, and only a few white men at each mine. There are some miners conducting the work of Kaffirs, and some are driving rock drills with two Kaffir boys as helpers. Tell miners they had better learn the use of the rock drill if they think of coming here, for without that knowledge they're not much use. For bossing boys £4 10s per week is the pay; then you want at least a slight knowledge of Kaffir lingo, and that is no joke to acquire. Machine men get £1 per shift when on wages, but it is nearly all contract work. I walked three weeks along the line of reef looking for work, and now I have got it I have scarcely cleared my tucker bill as yet, which is 27s per week. On the other hand, my mate makes 25s per shift. We have to pay a poll tax of 18s a year, and no vote or voice in the election unless resident for 15 years."

A Fortune in a Tin Roof.

Three thousand dollars for an old tin roof would be a pretty steep price, but the man who gets the battered roof from the old Tabernacle church, Broad street and South Penn square, Philadelphia, which is now being torn away, for that sum will be in great luck. Some years ago the paint was scraped off the old roof and yielded \$5000 in fine gold. It is almost as certain to yield as much this time. The gold comes from the United States Mint chimney, which is near by.

When gold is being coined, a considerable quantity of it volatilizes with the smoke through the chimney, and as soon as it strikes the air it falls. Much of it strikes the roof of the Mint—so much that the officials save even the water that falls upon it during a shower. All the drains from the roof are connected with large vats in the cellar of the Mint. Before the water finally gets to the sewer it is strained through many blankets and sieves, which retain the gold.

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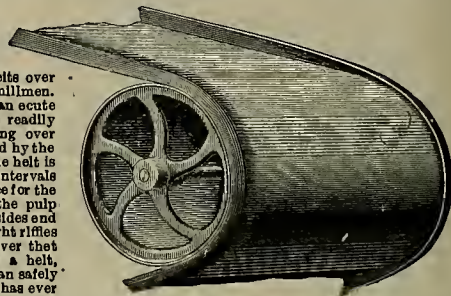
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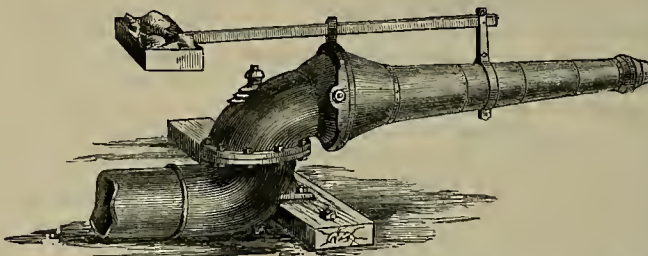
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Mining Summary.

The following is mostly condensed from journals published in the interior, in proximity to the mines mentioned.

CALIFORNIA.

Amador.

AMADOR NOTES.—*Ledger:* The Bellwether mine, the property of S. W. Bright was last week bonded to a capitalist from Montana for \$125,000 with the agreement that a prospecting mill of ten stamps will be erected upon the property within 90 days, and that 60 stamps more will be added in 18 months. The man who bonded the property left Jackson upon securing the bond to consult with his partner in the enterprise, but before leaving put some men at work upon the property in charge of J. DiVecchio to get things in readiness for the hoist and mill which he designs to construct forthwith.

The people of Jackson are delighted with the condition of affairs at the Hardenburg. During the past few weeks they opened up a ledge which the outside people aver will go \$40 a ton. It is of such size that additional stamps are contemplated. Two concentrators have been put in during the past week. Upon his last trip to the mine, C. D. Lane of Angels looked over the ground very carefully with the idea in view of locating a new shaft. A new hoisting plant has been constructed, and, if a new shaft is sunk, will be placed over it, instead of at the old shaft.

An effort was made about a year ago to resuscitate the Good Hope mine, but the stringency of the money market at that time, and the tenacity with which the chief owner, Chas. Peters, held on to the control of the property, made it impossible to effect that, and the matter was practically dropped. Mr. Peters has concluded to make another effort at resuming work in that mine, and upon conditions that are more liberal than he has ever before offered. The Good Hope Company, of which he owns most of the stock, will sell 25 per cent of the shares at \$1 per share, to be paid in monthly installments, the purchasers of these shares to be allowed the privilege of purchasing as many shares as will place the control in the hands of the new members of the company. The president of the company, Robert Aitken, has in preparation a prospectus, which will be circulated in a few days.

I. N. Dewitt is in charge of a gang of men who for a little more than a week have been working upon the tribute plan at the Amador Queen mine. This is the same property which a few weeks ago was worked by a number of men in charge of John Fox, and who disagreed and quit the work after running the mill about a week. At that milling they got about \$10 per ton in free gold. The present force is chiefly busy with reopening and getting ready to start up in good condition; still, they have already taken out about 50 tons of rock. The force now consists of Dewitt, a blacksmith and five other men. The tunnel in which they are at work is 1200 feet into the hill, with an upraise of 175 feet. They will start up in a short time with 10 stamps, the power coming from the Blue Lakes ditch, from which they get 350 feet pressure.

EXTENSIVE WORK.—*Record:* The most extensive property under the control of one corporation in Amador county is now held by the Mayflower Mining Company, at Amador City. It extends from Rancheria creek to the north line of the famous Keystone mine, and includes such well-known properties as the Bunker Hill, Mayflower and South Mayflower, the Little Amador and Kling mines, covering an area of near 5000 feet in length with a width varying from 300 to 600 feet.

Near the north end of the properties is located the splendid 40-stamp mill and hoisting works of the old Bunker Hill mine, in which region and on the adjoining Mayflower ground the most of the present development work is being done. Some 80 men are now employed, and 20 stamps are crushing the rock being raised. It is expected that the additional 20 stamps of the mill will soon be at work crushing the output of this part of the property. The company is making preparations to reopen what is known as the Johns shaft on the south side of the ridge near Amador City, on, we believe, the Little Amador property. This shaft was originally sunk to the depth of 700 feet. When cleaned out and repaired development work and further sinking will begin from that point. Knight & Co. of Sutter Creek are now figuring on a hoisting and pumping plant for use at this shaft. As soon as developments will warrant, a new 40-stamp mill with all modern improvements will also be erected.

Dr. Stephen H. Emmons, general manager and one of the heaviest stockholders in the Mayflower Company, has been in this vicinity for ten days past overlooking the work in hand. The doctor was accompanied by his son. Both returned to San Francisco yesterday.

Every indication points to the fact that this company will soon be employing a largely increased force of men. They have the ground necessary, and all of it is located in what has long been known as among the most desirable and richest properties on the famed mother lode.

Butte.

A MINING BOAT.—The Oroville *Mercury* describes the mining boat constructed by the Kansas City Dredge Co., at that place, as a substantial structure about 65 feet long, with an upper and lower deck and a hold. The machinery for raising the gravel consists of a dredger apparatus, of steel scoop buckets arranged on an endless chain. These dip into the bed of the river or the bed of gravel pro-

posed to be worked, and scoop up the earth, carrying it up to an elevated drum screen. There it is dumped and played upon by a stream of water pumped from below. As the screen revolves, the heavy gravel is thrown off, while the smaller gravel falls through the drum into an amalgamator, worked backward and forward with relatively the same motion as the old "long tom." When the heavy gravel is thrown off, it passes by means of an endless belt out over the boat to the river. After the gravel goes from the screen into the amalgamator, it is thoroughly amalgamated and passes out into a line of sluices equipped with Hungarian rifles, where the residue of gold is caught, thence out over the stern of the boat to the river. A 40-horse power engine runs all the machinery. The boat will be moved up and down the river from place to place by means of guy ropes from the shore. It is expected that it will be in action in about ten days or two weeks. The owners have expended a large sum in constructing the machine and have leased all the lands adjacent to the river.

Calaveras.

Osa Staike at Angels.—*Angels Echo:* A rich strike has recently been made in the Blair mine, near Smith's Flat. The rich discovery was made on the 200 level, where the vein is over 12 feet in width. The Blair mine is a splendid piece of property and gets richer as depth is attained. We understand that it is the intention of the owners to sink the shaft 100 feet deeper. When this mine is thoroughly developed it will be second to very few mines in this county as a gold-producer. It is said that \$46,000 was taken out of the Blair mine in a single day recently.

El Dorado.

SUMMIT FLAT'S BOOM.—Considerable stir is reported from Summit Flat, El Dorado county. The Granite and Unity mines are increasing their forces and pushing work day and night. Supt. Cummings of the Granite has leased the Rodgers mill, which he has repaired and put in first-class condition for the reduction of cement gravel. The Murdoch Bros. are vigorously prosecuting work at their Negro Flat claim. Col. Root has completed and is now running his five-stamp mill at the Ralph gravel mine, with a decidedly promising outlook. The Snow Bros. are about ready to start up their mine. Anton Bentler has got in a supply of timbers and commenced work on the old Union mine, which was famous in former years for its immense yield of gold. At the Texas Hill mine they are running a tunnel, and are now within 400 feet of the famous old Prospect Flat mine. Dr. W. W. Stone will immediately erect a five-stamp mill on the old Ignac mine, where they have recently struck a rich bed of cement.

Nevada.

MINAS' WADES.—There was great excitement in town last night for half an hour or so, says the Grass Valley *Union* of the 24th, when 13 or 14 carmen and landers came in from the Maryland mine looking for Supt. Dorsey. A notice had been posted at the mine that wages of carmen in future would be \$2.50 per day and landers \$2.75. Under the Idaho management the wages had never been less than \$3 for such workmen; and while the men were peaceable, they were determined to work for no less than the standard scale. Asst. Supt. Victor Dorsey, after listening to the men's grievances, informed all who left their work that they could return to work at \$3 per day, and this morning everything will move along as though nothing had happened.

LATO OFF.—*Herald:* When the day shift at the Harmony mine knocked off on Saturday evening, the miners—14 in all—were notified that their services were no longer required. Four men on the night shift were also "given their time," making 18 in all. Supt. Gowell assigned no reason for the draft, and the men asked for none. They take it that he discharged them merely from personal dislike as a result of the recent strike.

THE RAINBOW MINE.—*Herald:* The Rainbow mine, near Washington, is to be started up at once. It has been prospected for a year and a half, a whole year of which was spent in running a tunnel. Last fall the ledge was struck, and then Superintendent Garland closed down for the winter. Mr. Garland returned to the mine lately, taking several men from Nevada City. The Rainbow mine is a big proposition, and we shall hear from it this summer.

THE GOLD FLAT MINE.—The owners of the Gold Flat mine met recently in Grass Valley and decided to erect a five-stamp mill on the property for the present and in a short time more stamps will be put up. Dave Muir of Nevada City will build the mill.

Last Sunday a rich strike was made at the Eagle Bird mine, in Washington district, says the Nevada City *Transcript*. The ledge, as far as cut into, is 12 feet wide, and there is no telling how much wider it is. Some of the quartz shows free gold.

San Bernardino.

Red Rock PLORES.—The placer mines at Red Rock, 38 miles northeast of Mojave, are attracting considerable attention. They were discovered by a Mexican March 30th. It is reported that men are making from \$3 to \$5 per day. Men are coming in fast and taking up the best claims. Claims that will pay from \$3 to \$15 per day per man are sold from \$100 to \$1500.

A GOON CAMP.—*Kern Californian:* Summit mining district, out on the Mojave desert, is having a big boom. There are over 200 men permanent residents of the camp, and 60 dry washers are constantly at work. Curiously enough, the flat mesa lands pay better than the gulches, and the ground yields more gold right at the surface than it does deeper down. No

bedrock has been struck yet in this district, but at from 4 to 12 feet from the surface there is a layer of cemented clay where most of the mines stop, although the dirt below this will pay wages if worked. The gold from this district is worth \$18 an ounce, or from 50 to 60 cents per ounce more than the Red Rock and Goler gold. Every dry washer is working on pay dirt. The highest product lately has been an ounce and a quarter in a day, but an ounce of gold to the machine is the regular thing.

PLACER LOCATIONS.—*Mojave Miner:* Many placer locations have been made in the Burro creek country and it is said some of them are very valuable. The gold is coarse and easily saved. Men who are out of employment can make good wages working these claims, as wood and water are handy.

Siskiyou.

MINING NOTES.—*Yreka Journal:* R. S. Taylor brought to town last Friday about \$125 in coarse gold dust, taken from the head of Horse creek, a tributary of the Klamath, which was panned out in three or four days, by the party making the strike. The same person then cut through the rim into the gravel about 60 feet above and found still richer prospects, averaging from \$5 to \$15 per square yard of gravel washed in a pan.

Austin & Co. of the Greenhorn blue gravel mine, about a mile south of Yreka, still continue to take out good pay, or about \$900 a week. The yield has not varied from this amount to the extent of \$20 a week for six weeks past.

Although the above mines are called blue gravel beds, there does not seem to be any blue gravel where now worked. At the original shaft, first sunk down near Lee's house, the gravel was of a bluish, cement-like character, but the aniferous gravel now taken out is yellow, and fully as rich as the blue. There is no doubt that a vast area of this rich gravel, over 100 feet below the surface, on Greenhorn creek and throughout Yreka basin which is likely to be developed in course of time.

Trinity.

GOING AHEAD.—*Journal:* Water is running through the La Grange Hydraulic Mining Company's ditch to the mine, with the exception of about three miles at the head, where the snow is very deep and there are some slides not yet cleared out. It was turned through the pipe lines last Monday. At present about 800 inches of water are delivered at the mine. The Coal creek water will soon be turned in, increasing the supply by 300 or 400 inches. The mine now has a better water supply than ever before.

NEVADA.

Washoe District.

ON THE COMSTOCK.—*Enterprise:* The south drift from the top of the raise above the 1000 level of the Consolidated California & Virginia is showing more favorable in the face as the shaft is advanced.

The Alta mine has above 250 tons of ore on hand, extracted from the various openings in the vicinity of the 725 level. The average assay value of this ore, by car sample, is about \$35 per ton. The mill is in first-class order, and will be started up in about ten days. The official letter from Colonel Boyle, detailing operations the current week, shows that gold predominates over silver in the ore extracted in a ratio of three-fourths of the former to one-fourth of the latter.

Following are the official letters of superintendents detailing operations in the Comstock mines the current week.

CON. CAL. & VIRGINIA.—On the 1650 level the drift running north from the end of east crosscut No. 1 run from the north drift from the winze—down 52 feet—has been extended during the week 10 feet; total length, 136 feet. From this drift north, at a point 126 feet in from its mouth, an east crosscut was started and has been advanced ten feet in porphyry and streaks of quartz of low assay value. At a point 120 feet south from the winze and 20 feet below the sill floor of this level (1650 level), we cut through six feet of ore. In stopping out upward on this ore body we have extracted during the week 35 carloads of ore, the average assay value of which is \$76.70 per ton.

1000 level (the Rule drift).—The drift running south, from the upraise, 50 feet was carried up at a point 353 feet south from the shaft station, on the east crosscut, has been extended 42 feet, and from this east crosscut, at a point 180 feet in from its mouth, a south drift has been advanced 16 feet in some vein matter carrying a low assay value.

At a point 477 feet south from the shaft station a west crosscut—No. 2—has been advanced 30 feet in vein matter. At a point 590 feet south from the shaft station a west crosscut—No. 3—has been advanced 30 feet in porphyry and quartz.

ANDES—420 level.—The upraise started in the west crosscut No. 1 from the main north lateral drift was carried up 12 feet during the week, continuing in quartz.

UNION MINE—900 level.—The Union Con. and Sierra Nevada joint east crosscut near the north line of the Union mine, running from the joint west drift, at a point 1520 feet west of shaft, has been extended during the week 15 feet; total length, 248 feet; face in hard porphyry.

OPHIE—1465 level.—The drift running south from the drift run west from the main north drift, at a point 219 feet in from the mouth of the creosote, has been extended during the week 19 feet; total length 44 feet, continuing in porphyry showing lines of quartz.

As joint work with the Mexican Company, repairs have been made in the main shaft at and near the 700-level station.

Central Tunnel.—The north drift from the main west drift has been reopened and repaired during the week 26 feet; total length reopened

303 feet, and it has reached the north end of the old Mexican shaft station.

MEXICAN—1465 level.—The upraise started near the mouth of the crosscut run west from the drift run south from the top of the upraise, which was carried up 45 feet above the sill floor of this level at a point 40 feet from the main north drift and 100 feet north from the south line of the mine, has been carried up during the week eight feet; total height, 74 feet; continuing in a very hard porphyry formation.

As joint work with the Ophir Company, repairs have been made during the week in the Ophir shaft at and near the 700-level station.

BAST & BALCHRA.—On the 900 level during the past week the main north drift has been cleaned and repaired a distance of 160 feet; total length, 320 feet.

GOULD & CUNAY.—On the 200 level west crosscut No. 5, started in the northwest drift, 432 feet from the main west drift, has been extended 18 feet; total length, 1028 feet; face in porphyry.

HALA & NORCROSA—900 level.—Advanced the south drift 10 feet; total length, 192 feet; face in porphyry.

1100 level.—Advanced the main south drift 21 feet; total length, 193 feet; face in porphyry.

WEST CON. VA. & CAL.—During the past week the west crosscut on the 1100 level, run from a point 320 feet north of the shaft station, has been extended 26 feet, and is now in a total distance of 705 feet. Face in hard quartzite, with slight indications of a change of material. The flow of water has somewhat decreased since the last report.

SAVANA.—On the 1050 level the north drift from the station was advanced 28 feet, making its total length 58 feet. The west crosscut from southeast drift, started 225 feet from the shaft, was advanced 6 feet; total length, 47 feet; face in quartz and porphyry. The south drift was advanced 22 feet, making the total length 177 feet from the shaft. On the 1100 level the north drift from the shaft was advanced 15 feet; total length, 152 feet; face in porphyry.

On the 12th floor they are extracting some pay ore.

During the week they hoisted 30 cars of ore from the 1050 and 1100 levels; car samples average \$19.50.

Sao. BALCHRA.—The north drift on the 1150 level, from the top of the 1200-level raise, has been extended to a total distance of 62 feet and stopped. From the end of it a west crosscut has been started and is out 11 feet. The face is in a mixture of clay, porphyry and low-grade quartz.

We continue to save about seven tons of fair-grade ore per week from the south raise on the 1150 level.

CAWON POINT.—The south drift from the top of the 700-level raise on the 600 level is now out 63 feet. The face is in a mixture of clay and porphyry. The south drift on the 7th floor of the 700 level raise is now out 54 feet. The face is in porphyry and low-grade quartz. The south drift from the station on the 500 level is out 37 feet. The formation in the face is in a mixture of porphyry and low-grade quartz.

SIERRA NAVAJO.—The south lateral drift from the intermediate tunnel has been advanced 30 feet; total length, 633 feet; face in hard porphyry.

Have started a joint west crosscut near the north line of the Union mine from the north drift 1520 feet west of the shaft, 900 level, and advanced same 15 feet; face in hard porphyry.

CHOLLAR.—The north drift, 100 level, has been extended during the week 22 feet; total length, 139 feet; face in quartz and porphyry.

The west crosscut on this level, 300 feet south of the north line, was extended 32 feet; total length, 132 feet; face in a mixture of soft porphyry and quartz.

ALTA.—On the 725 level the south raise continues to look well as we advance upward, and the intermediate winze shows a decided improvement, gold predominating in the assays over the silver. Average assays, \$38.60, \$26 of which is gold. There is no change in the drift from the north raise.

POROSI.—The south drift on the 450 level has been advanced 24 feet; total length, 348 feet; face shows streaks and bunches of fair-grade quartz. The south drift, 50 feet above the 450 level, is out 82 feet, having been advanced 27 feet; face in porphyry, clay and quartz.

BELCHER.—On the 850 level the north drift has been cleaned out and retimbered a distance of 30 feet, making its total length 355 feet from the shaft. During the week 27 tons of fair-grade ore were extracted and hoisted to the surface.

UNION SHAFT.—Have started a joint west crosscut near the north line of the Union mine from the north drift, 1520 feet west of the shaft on the 900 level, and advanced same 15 feet; face in hard porphyry.

WARD COMBINATION SHAFT.—The west drift from the station, 820 level Ward shaft, is out 750 feet from the shaft; face in porphyry and seams of quartz.

BULLION.—The west drift from the station, 820 level, Ward shaft, is out 750 feet from the shaft; face in porphyry and seams of clay.

BONANZA TALK.—*Virginia Enterprise*, April 24: The ore discovery in the vicinity of the 1650 level of the Consolidated California & Virginia caused a sharp upward movement in that stock in yesterday's opening session of the boards, and the stock closed strong last evening at an advance of 30 cents above last week's top quotation.

The recent ore discovery is not in the vicinity of the old workings, but is in entirely new ground, and further important developments are among the probabilities.

Public feeling is ripe for a market, and should the present discovery widen out either

above or below, an advance in price of the stock equal to that following the discovery in 1886, is predicted by sanguine operators, while the more conservative are talking the price up to \$30 per share.

Superintendent Sharon of the Yellow Jacket, Belcher and other Gold Hill mines returned to the Comstock yesterday from a business trip to San Francisco. He says there are over 200 tons of fair-grade ore accumulated in the bins at the Yellow Jacket, and about the same amount at the Belcher, and that the billion returns from this ore, when crushed, will more than cover operating expenses the current month.

Herman Zadig, the well-known mining operator, arrived on the Comstock on Sunday to inspect the properties under his control. Mr. Zadig is confident that the Comstock share market will show an important advance in prices before the close of the current month.

The following official mining letters were filed at the local offices on Saturday:

OCCIDENTAL.—From the 1100 level above the 400 level we continue to extract about eight tons of ore per week showing an average value of \$46 per ton.

KENTUCK.—On the 1100 level the south drift from the top of raise No. 1 is in 59 feet, and continues in fair-grade ore. On the 1200 level the south drift from the Yellow Jacket incline is at a total distance of 51 feet, the face in low-grade ore.

JUSTICE.—The south drift from the winze sunk from the Blaine tunnel has been extended 15 feet since last report; total length 76 feet. The face shows a width of about three feet of ore which is saved for pay.

CONSIDERED FAVORABLE.—*Enterprise.* Connections having been made with the old Mexican shaft, the work of extending the central tunnel westward will begin this week. The ground to be penetrated is favorable for an important development, as the crosscut is being advanced in a region interlaced with small veins of low-grade quartz, which indicate the proximity of an ore body as surely as the roots of a tree are evidence that the trunk is not far distant.

Flowery District.

CHANGING THEIR SYSTEM.—*Virginia Enterprise.* Several owners of blanket sluices along the course of Six-Mile Canyon creek will turn their attention to placer mining, as the return from sulphuret concentrations obtained from ore tailings barely pay expense. Coarse gold has frequently been found in the bed of Six-Mile Canyon creek, but not in sufficient quantities to make it remunerative. The surface workings of locations in Flowery district all show a preponderance of gold in the quartz veins; and, as the low price of silver has made mining for that metal unprofitable, prospectors are devoting their time exclusively to a search for the yellow metal, and Flowery district offers better inducements to gold-seekers than any other locality in this county.

Ferguson District.

A mining expert, who recently returned to Salt Lake from a visit to Ferguson district, says that it is the greatest camp he ever saw. He says that it is safe to estimate that there are 1,000,000 tons of ore in sight in the district that will assay from \$10 to \$100 in gold. The camp is now conveniently located, and it will cost at least \$50,000 to get water in to work the ores cheaply. The ores that are being worked at present have to be hauled 35 miles, either to Hiko or the Condor mill at Pioche.

ALASKA.

ALASKA PRICES.—The *Juneau News*, on authority of Hank Wright, a miner, says that Miller creek last year produced \$100,000 from 46 claims. Wright and his partners took out \$14,000 last season. There were six to eight feet of loam and ice above the pay gravel to be removed. The discovery claim yielded \$6000 last year. Four other partners took out \$6000 each. The French brothers got \$8000 in dust. Wright believes that richer diggings can be found farther up the stream. At Franklin gulch 35 men last year averaged \$1000 to \$1200 each. There are about 300 people in the Yukon country and about 150 wintered at Forty Mile, which contains 80 cabins. The current prices there are: Flour, per cwt., \$6 to \$8; bacon, 25 to 40 cents per lb.; sugar, 15 to 20 cents per lb.; beans, 12 cents per lb.; Caribou meat, 7 to 10 cents; clothes, \$20 upwards; gum boots, \$10 to \$12, and board \$40 per month.

COLORADO.

REPORT ON DUNCAN ORE.—Duncan is feeling the effects of the mining upheaval. Everything, says the *Garrison Tribune*, is on the move, everybody is busy and in high spirits, and the mines are showing better than ever. Several new business houses have recently been erected, and many new residences have sprung up in the town. All the mills now there are running, and several others are soon to be built. Some Salt Lake investors who recently visited the camp selected samples from the Puritan mine and give this as the result of their tests: In the first-class concentrates they find 3.4 ounces of silver and 39.4 ounces gold, representing a value of \$780 per ton. Considering that 30 per cent of the value in this ore is in free gold, and had been taken out before the test was made, it shows that the mines are immensely rich. Second-hand concentrates show a value of \$48 and the tailings \$4.60. This also demonstrates that the deeper workings show a much higher value than the surface. The ore in the pay streak is a quartz carrying copper and iron, and has widened from a mere streak at the surface to about eight inches at a depth of 150 feet in three different levels. Besides this, there is a body of from four to eight feet of low-grade ore which is now being milled in which there is great value. There is also some

tellurium in the vein. Messrs. Ernest and Kelly, two experts from Denver, who were sent in to investigate gold properties in this camp, will report favorably, the *Tribune* says. They say the formation is the same as a camp of their acquaintance in New Mexico, where ore from a two-foot vein was freighted by wagons a distance of 105 miles and made a great success, and the veins here are much larger and give promise of being much richer.

AT YANKEE HILL.—Work on the big Alice concentrating mill was started on Wednesday. The concentrator will be what is known as the Stoddard concentrator, a German invention, and similar to the one used by the Smuggler mine at Aspen. It will have a daily capacity of 100 tons. McFarlane & Co. of Central City have the contract for building the mill, which, when finished, will have cost \$60,000.

SPOOK CITY.—Ford Creek district, near Saguache, is attracting the attention of mining men and is rapidly filling up with prospectors. The principal settlement is Spook City, and its enterprising residents have sent on a petition to Washington for a postoffice. Biedell camp, in the same vicinity, is also looming up, according to the *Saguache Crescent*.

IDAHO.

A BIO ENTERPRISE.—*Lamar Nugget.* Parties, backed by abundant capital, are now endeavoring to make negotiations for the greatest mining enterprise ever proposed in Owyhee county, if not in Idaho. Notwithstanding the many millions in bullion which War Eagle mountain has produced, all who are familiar with that pile of granite, ribbed and seamed with mineral-bearing veins, must admit that the wealth taken from them is comparatively nothing in proportion to what still remains. The proposed tunnel, running directly across the course of the veins, would cut them at depths of from 1400 to 2000 feet. The first series of veins would be reached by the tunnel at a depth of 1400 feet, at a distance of less than 4000 feet from its mouth. Extending it 4000 feet farther, almost every vein in the mountain would be cut. The mouth of the proposed tunnel would be where to day grass is growing and summer is on, while still the surface of the mountain overtopping it is so buried in snow that it is almost impossible to reach it with teams. The water power is there in sufficient supply to work all the machinery required to drive the tunnel and to run all the mills required to reduce the ores.

SOLD TO A SYNDICATE.—*Anaconda Standard.* From Idaho comes the news that Governor Wilson has sold his immense placer mining machinery and claims to a wealthy English syndicate. The sum which Mr. Wilson receives is in excess of \$250,000. It is a handsome reward for the thirty years of toil which Governor Wilson has devoted to the development of the great property. Anywhere in these regions well-informed mining men will tell you that in point of natural richness and systematic development Ben Wilson's great properties at Pioneer lead the best of them. In the last quarter of a century it is estimated that not less than \$100,000,000 in gold has been taken from the wonderful placers of the Basin. Wilson's vast property has been worked constantly during all of that time, and for years a day and night shift kept the sluice boxes full.

TO WORK UNDER WATER.—The *Shoshone Journal* says: Root Brothers and Dnnbar, of Chicago, are making extensive preparations to mine the bare in the bed of Snake river, between the Shoshone falls and the Blue lake. The bare are from six to eight feet under water and the dirt will be raised with centrifugal pumps. The machinery, consisting of boiler, engine and pumps arrived here Wednesday from Chicago. A flatboat fifty feet long will be anchored in the middle of the stream, over the bar, and on this the machinery will be placed, and the dirt and gravel will be raised from the upper end of the boat, and run over the gold-saving machine, then the waste will be dumped into the river at the lower end of the boat. While this is a new system of mining bars there is no doubt but that it will prove successful, and as soon as it is demonstrated a success, thousands of Snake river bars, now under water, will be worked.

MURRAY CORRESPONDENCE.—With the opening of the mining season Murray is in better spirits than for some years past. There is promise of an abundance of water for placer operations. The "old wash," which lies on the slope facing the south and therefore gets the water from early melting of snow, is now the scene of greatest activity. There are booming operations in a number of the side gulches. On Tiger gulch Messrs. Williamson and partners will soon resume. Booming began on that gulch last fall. The Golden Chest is employing about 30 men and getting a good grade of quartz. The 10-stamp mill is kept constantly at work and crushes about 30 tons every 24 hours.

The Mother Lode mill is also running ten stamps steadily with water power and turning out gold bricks as usual. They contemplate adding a rope tramway to the plant soon, which will let their ore cars right down into the mill.

The Messrs. Coplen have begun the erection of a quartz mill on the "Daddy" lode, and will mill quartz obtained from the same vein as the Mother lode. They expect to have a capacity of ten stamps eventually, but are only putting in five stamps now.

There are many miners here seeking employment, and it is not likely the miners' unions will order any strikes again soon in this country. Their interest is now to assure timid capital and thus get employment. The roads will soon be open for traffic, a large number of men being now at work shoveling through the two-mile divide, opening a wagon road to the railroad at Osburn.

MONTANA.

THE CURLEW MINE.—*Missoula Silverite.* The Helena and Victor Mining Company is working a large force of men on the Curlew mine and is running the concentrator. The ore chute recently discovered on the 500-foot level is improving in size and grade, and it is thought it will equal those ore bodies which have produced so much ore from the upper levels. This chute is thought, however, to be entirely distinct from any other heretofore found in the mine. It is 400 or 500 feet away from the main contact and does not seem to be connected with the other ore bodies.

OREGON.

IN JOSEPHINE COUNTY.—*Grant's Pass Courier.* Fred Maher has struck a bonanza between Thompson creek and Williams creek. He has found a two-foot vein of gold-bearing quartz which mortars from \$2 to \$20 to the pan. This is no pocket, but a true fissure vein, and bears every evidence of being a permanent thing. A strike of this kind would be heralded in some countries with a column article and four scare-head double-pica capital lines, but they have become too common in Josephine county to get excited over.

The success of the tunneling in the Ashland mine settles the question as to permanency of mines in southern Oregon. Heretofore the cry has been that our veins of gold "peter out" or become base at the depth of a few hundred feet, but this tunnel at Ashland is 600 feet long, and has found a richer and wider vein of quartz than that upon which the mill had been crushing for nearly a year with such good results.

Josephine county's gold dust has helped tide over the hard times. During the past two years an immense amount of prospecting has been done and a silent stream of yellow dust has been flowing out in consequence. Nobody, unless directly interested, ever sees this product going on its way to market, but the coin derived therefrom is all spent here, and thus Grant's Pass business men have had fewer sight drafts to pay than those of any town in southern Oregon.

JACKSON COUNTY.—*Times.* Conger & Arnold have two Tremain quartz-mills on the Governor Chadwick mine on Rogne river, opposite Fort Lane, and will commence crushing ore this week. They have bonded a large area of land. It is rumored that Mangum & Stewart of Tacoma, who purchased the Grandpner place, have bonded the Sterling Mining Co.'s property at a high figure. Capt. C. H. Thompson, of Detroit, Mich., who has been in the valley for a few weeks looking at various mining properties, has arranged to bond the Braden ledge in Gold Hill district. He has been interested in Colorado mining property with Gen. Russell A. Alger, and it is supposed that the latter gentleman is also in the present deal.

Medford Mail: W. H. Rhoten and A. W. Sturges are placer mining up on Jackson creek, and are meeting with success in big chunks. Last week they took out 68 ounces of clear gold from their flume, as the result of a two months' run. They have not made their cleanup yet, nor will they do so as long as the water supply holds out, but when they do rich returns are expected.

BAKER COUNTY.—*Democrat.* The establishment of a smelter and sampling works in Baker City is in the interest of the mine-owners directly. The man who is the possessor of a mine and too poor to erect a mill thereon, or unable to purchase development work, will find a smelter a godsend. The Baker City Sampling Works started up yesterday with a reduction capacity of ten tons of ore per day. The run started on ore from the Gorman & Reynolds mine, in Virtue district, and good returns are expected. Other consignments of ore are contracted for, and it is thought the mill will be kept in steady operation.

UTAH.

SOME BIG FINDINGS.—Writing from Clifton regarding the Troy ledge, a *S. L. Tribune* correspondent says: "Two assays were made from this rock on the 27th day of January last by Charles Carter, the superintendent of the Gold Hill mills, the first of which gave \$5860.40 in gold and 208.03 ounces in silver. The results of this assay, as I am informed, seemed to the assayer as being so extraordinary that he supposed a mistake had been made, and, to satisfy himself that he was not mistaken, he tried a portion of the remaining pulp in washing with a horn. This at once convinced him that the ore was extraordinarily rich, and then to test the first a second assay was made with greater precaution than before, resulting in an exhibit of \$5892.20 in gold and 214.7 in silver. To add to the richness of the above, it should be stated that the writer hereof prepared the pulp for assay himself, and that in so doing it was his aim to put about one-tenth of the silver pulp to nine-tenths of the gold pulp in the amount sent to the assayer, so that to multiply the silver part of the assay by ten, you have a result of a fraction over 2354 ounces of silver. At this writing no work below the surface has been done, but old miners who have examined the ledge above the surface state that at least \$25,000 can be seen in sight. To the old miners and prospectors who have been familiar with the district for the past 15 or 20 years, the above statement would naturally seem overdrawn; but from those who are now upon the ground, your correspondent has no fear of being contradicted."

WYOMING.

WYOMING MINES.—*Cor. Denver Record.* The outlook in this section is favorable to an advance in mining work at an early date. More real hard and effective work was done in the Douglas and La Plata mining districts the past winter than all the years since valuable mineral was found in the Medicine Bow range. The great snowfall in the mountains west of this city insures ample water for a lengthy run in

the placer mines of Douglas creek and its numerous tributaries. The Douglas Consolidated Placer Mining and Milling Company is making preparations to put quite a force of men to work on its property at as early a day as practicable. This company's property consists of over 2300 acres of placers, located under the mining laws of the United States, and so taken as to cover the best of the first bottom land of the creeks, in the Medicine Bow range of mountains, townships 13 and 14, north range 78 and 79, west of the sixth principal meridian, in Albany county, State of Wyoming, and at an altitude of from 8500 to 9000 feet above sea level. The soil is composed of gravel wash of granite, gneiss, quartz and syenite and detritus of the surrounding hills, with a bedrock of granite and gneiss. The depth of the soil or wash is from 4 to 20 feet, the quality a heavy gravel with black sand, and occasionally a few boulders, but none so large but what can be readily handled. The bars are of varying extent and width, from a few to 200 acres. Pine, spruce and fir balsam cover the hills, abundant and of good quality for saw timber and all mining purposes. The timber is tall and straight, and there are many good sawmill settings, rendering the purchasing and transportation of lumber unnecessary; along the creeks are open parks covered with rich grass and willows. These claims are well watered by numerous creeks running through, the snowfall in winter being heavy, and the rainfall abundant during the summer months. Douglas creek, the principal stream, runs through most of the claims.

Patents Issued to Pacific Coast Inventors.

Reported by Dewey & Co., Pioneer Patent Solicitors for Pacific Coast, 220 Market Street.

FOR THE WEEK ENDING APRIL 17, 1894.

- 5,843.88.—CALCULATOR.—D. L. Albert, S. F.
- 5,843.89.—SALT AND PEPPER BOX.—C. M. Berry, S. F.
- 5,843.90.—CARINET.—A. Beyer, Spokane, Wash.
- 5,843.91.—LAWN SPRINKLER.—S. M. Black, Pasadena, Cal.
- 5,843.92.—DYNAMO.—H. E. Dikeman, Berkeley, Cal.
- 5,843.93.—CAR COUPLING.—Wm. Dunlap, San Diego, Cal.
- 5,843.94.—FRUIT KNIFE.—N. B. Hale, San Bernardino, Cal.
- 5,843.95.—ELECTRIC METAL PIPE.—C. S. Hamilton, Los Angeles, Cal.
- 5,843.96.—HOCK.—D. W. Holden, Gardiner, Ogo.
- 5,843.97.—SASH FASTENER.—Grate M. Kimball, Oakland, Cal.
- 5,843.98.—METAL CAN.—John Lee, San Mateo, Cal.
- 5,843.99.—SAW SAW.—H. Lee, Los Angeles, Cal.
- 5,844.00.—SASH HOLDER.—W. H. Masterman, Los Angeles, Cal.
- 5,844.01.—BRIDLE ROD.—H. A. Morin, San Leandro, Cal.
- 5,844.02.—BALLIST Bx.—H. H. Niebur, Ferndale, Cal.
- 5,844.03.—PRESERVING PILES.—A. A. Polhamus, San Diego, Cal.
- 5,844.04.—GAS BURNER COOK.—G. A. Fies, S. F.
- 5,844.05.—TELEPHONE EXCHANGE.—Sabin & Hampton, S. F.
- 5,844.06.—" " " " " " " "
- 5,844.07.—" " " " " " " "
- 5,844.08.—" " " " " " " "
- 5,844.09.—WATER-WHEEL REGULATOR.—Sensibler & Van Krenon, S. F.
- 5,844.10.—PURIFIER.—G. F. Tieman, S. F.
- 5,844.11.—PIPE JOINDER.—W. A. Tipson, S. F.
- 5,844.12.—PIPE-MAKING MACHINE.—W. A. Tipson, S. F.
- 5,844.13.—" " " " " " " "
- 5,844.14.—VALVE.—C. H. Watson, Riverside, Cal.
- 5,844.15.—DISH CLEANER.—F. H. West, Portland, Ogo.

NOTE.—Copies of U. S. and Foreign patents furnished by Dewey & Co. in the shortest time possible (by mail or telegraphic order). American and Foreign patents obtained, and general patent business for Pacific Coast inventors transacted with perfect security, at reasonable rates, and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey & Co.'s Scientific Press U. S. and Foreign Patent Agency, the following are worthy of special mention:

SASH HOLDER.—William H. Masterman, Oakland, Cal. No. 518,413. Dated April 17, 1894. The object of this invention is to provide an improved holder which is adapted to tighten and fasten window sashes in their frames, and it is especially useful for car windows, or others which are subjected to considerable jar and rattle. It consists of a spring-actuated plate having one edge beveled; a separate strip let into the sash groove having a beveled face for the beveled edge of the plate; a shank at the center of the plate, adapted to enter a recess in the sash, with coil springs seated in recesses in the sash to bear on opposite ends of the sash; and a face-plate, covering the sash with an elongated slot through which a pin or stud from the shank projects; and a vertically-disposed lever pivoted at one end to the face-plate, with a finger piece upon the opposite end by which the device is operated.

CALCULATOR FOR WAGES, ETC.—David L. Albert, San Francisco, Cal. No. 518,438. Dated April 17, 1894. The object of this invention is to provide an implement which is adapted to mechanically ascertain the wages of men for any number of days and parts of days at any rate per month. It consists of disks pivoted concentrically and mounted one above the other with a suitable handle and back plate upon which they turn. These disks are marked one with the number of working days in the month and spaces for parts of days, a disk behind this of sufficiently larger diameter to expose figures around the periphery indicating days and quarter days, still another disk behind this of larger diameter indicating half-day divisions, and a third disk indicating three-quarter divisions. Above all these is fixed a disk with a radial slot upon one side of which are marked the rate of wages per month between any given figures, as from \$30 to \$75, depending upon the class of labor that is being paid for. Each of the first named disks have concentric circles with the wages payable for the number of days and parts of days, and adapted to coincide with the radial lines of figures just described, so that when any of these disks are turned to bring certain figures in conjunction with those upon the outer disk, the amount for the given number of days will be instantly determined.

Market Reports.

The Markets.

SAN FRANCISCO, April 26, 1894.
Silver advanced steadily through the week, going above 64c. On the last day of '93 it was 68c for 1,000 fine in New York. It has been down to 61½c, but the probabilities do not favor a further drop.

The local bullion, money and exchange quotations current are as follows:

Commercial Loans, % per annum	7@8
Commercial Loans, prime	6@9
Call Loans, gilt-edged	7@8
Call Loans, mixed securities	7@8
Mortgages, prime, taxes paid by tender	7@8
New York Sight Draft	12½c
New York Telegraphic Transfer	17½c
London Bankers', 60 days	\$4.88½
London Merchants'	\$4.85
London Sight Bankers'	\$4.89½
Refined Silver, per ounce	64½
Mexican Dollars, nominal	53@53½

Latest London cables say there was distinct improvement to-day. English railroads were bought on favorable traffic returns, but speculative stocks were also bought, including Americans, which show fractional gains, closing steady. Silver was up to 23½d on the Indian buying, said to be speculative on the belief that the mints will reopen. This rumor depressed Rupee paper. The Indian Council sold 59 lakhs of Rupees at rates ranging up to 13 19-32. The amount offered for next week has been increased to 60 lakhs. Seventy-one thousand pounds of gold were bought.

New York Prices.

NEW YORK, April 26.—Following are the closing prices for the week:

	London.	N. Y.	Copper.	Lead.	Tin.
Thursday	28½	63	9 50	3 20	19 60
Friday	28½	63	9 50	3 20	19 60
Saturday	28½	63	9 50	3 20	19 60
Monday	29	63½	9 50	3 20	19 60
Tuesday	29½	64	9 50	3 25	19 70
Wednesday	29½	64½	9 50	3 25	19 70

SAN FRANCISCO METAL AND COAL MARKET.

ANTIMONY.		QUICKSILVER.	
Per lb.	@ 13	Home trade, pt.	33 00 @ 34 50
COPPER.		STEEL.	
Refined, in car lots	@ 74	Galvanized	@ 20
Powdered, do	@ 72	English, B.	@ 20
Concentrated, do	@ 71	Canion tool	@ 18
All grades of jobbing at advance.	@ 70	Silk Dism'd tool	@ 15
OIL.		PICK & HAMMER.	
Boit.	@ 23	do	@ 10
Sheathing.	@ 23	do	@ 10
Ingot, jobbing.	@ 23	do	@ 10
Do, wholesale.	@ 23	do	@ 10
IRON.		COPPER.	
Bar, base.	@ 24	Spot	@ 22
Norway, base.	@ 24	Spot	@ 22
PIG IRON.		COPPER.	
English	@ 24	Spot	@ 22
Glengarnock	@ 24	Spot	@ 22
Am. Soft, No. 1.	@ 24	Spot	@ 22
Shot No. 1.	@ 24	Spot	@ 22
Puget Sound	@ 24	Spot	@ 22
Olay Lane White	@ 24	Spot	@ 22
Langdon	@ 24	Spot	@ 22
Garberville	@ 24	Spot	@ 22
Barrow	@ 24	Spot	@ 22
Cargolite	@ 24	Spot	@ 22
LEAD.		COPPER.	
Pig.	@ 24	Spot	@ 22
Sheet.	@ 24	Spot	@ 22
Pipe.	@ 24	Spot	@ 22
SILVER.		COPPER.	
Drop, sizes smaller than	@ 24	Spot	@ 22
B. ½ bag of 25 lbs.	@ 24	Spot	@ 22
Do, B. and larger sizes	@ 24	Spot	@ 22
½ bag of 25 lbs.	@ 24	Spot	@ 22
Book, Balls and Chilled	@ 24	Spot	@ 22
Do, ½ bag of 25 lbs.	@ 24	Spot	@ 22

Mining Share Market.

SAN FRANCISCO, April 26, 1894.
The "idle millions" of dollars about which so much has been said and sung, appear to be afforded an outlet in the stock market, for, according to the real estate and mercantile reports for the week, there was more money in Pine street operations than any other line. Every stock on the list has shown the effect of the reawakened interest and not for months have there been so many buyers. When people cannot get six per cent for their money, and are chary about putting it into ordinary business enterprises, they naturally turn to some outlet for speculative transactions. The increase in the price of silver bullion also lends an increased argentiferous lining to the clouds that so heavily lowered.

The break in the market Tuesday was followed by an advance. Con. Virginia selling up to \$5, the strike on the 1650 level being to many a warrant for investment. There was a flurry Wednesday, occasioned by exaggerated reports of fire in Virginia City, which in reality amounted to nothing, but the day closed with sales of Con. Cal. & Virginia aggregating 10,000 shares. Enthusiastic operators say it will go to \$30. In this regard the old advice is good: "Don't never predict unless you know." It is evident, however, that the general feeling favors a lively market. One year ago Con. Cal. & Virginia sold at less than one-half its present price.

A VERY successful trial has been made in Sweden to fell trees by means of electricity. The process is very simple, and consists in passing a platina wire round the stem of the tree and heating it to a glow, cutting through the same much in the same way as one would divide a piece of soap with twine. One of the chief advantages is that the cut end of the log being burnt gives the log a better quality.

J. F. CROSETT, Commission Mining Agency,
628 Sacramento St., San Francisco, Cal.
Buy and Sell Meritorious Mining Properties. I have orders for Income-Paying Mines at the present time. Have also some good properties for sale. I want more mines to offer to purchasers and also desire more purchasers to examine properties I have to offer. Correspondence solicited.

Coast Industrial Notes.

—The sale of the Union Mill has been concluded. The price paid by Sperry & Co. was \$290,000.

—The Fulton Engineering and Ship-Building Works is completing the new ferry-boat Sausalito, and expect to have it ready for launching in about a month.

—The Keystone Supply Company has incorporated with a capital of \$100,000, fully subscribed. Directors: M. J. McDonald, J. S. Emery, Robert McF. Doble, J. H. Isham, Charles E. Anderson.

—The board of directors of the Pacific Improvement Company has decided to place property valued at from \$10,000,000 to \$12,000,000 in the charge of the land department of the Central Pacific road for disposal.

—The Baldwin Livery Company has filed articles of Incorporation. Directors: J. G. Spaulding, C. W. Nevin, H. W. Potter, J. H. Banfield, W. H. Ward. Capital, \$10,000, of which \$4000 has been subscribed.

—The Hutchison Water Gas Furnace Company has incorporated with a capital of \$100,000, fully subscribed by the following directors: E. O. Burns, Vincent Wallace, Owen Burns, Samuel Brown, X. E. Burns.

—The Prosper Fishing and Trading Company is incorporated. Directors—William Hunter, William Schrader, Elias O. Dahl, Edward Kruse and Emil T. Kruse. Capital stock, \$160,000, of which \$1350 has been subscribed.

—The Vancouver, Klickitat and Yakima Railroad has been sold to New York capitalists for \$110,000. It is understood that the road will be extended to connect with the Northern Pacific. The name will be changed to the Portland, Vancouver and Northern Railroad.

—The annual meeting of the stockholders in the Union Pacific Railway Company was held last Wednesday. The report of the directors shows a deficit for the year on the whole system of \$2,595,841, compared with a surplus the previous year of \$2,006,757. The heavy decrease was due to the silver crisis, the failure of the Kansas wheat crop and the general prostration of business. The control of the stock is going abroad. The Oregon Short Line and the Utah Northern show a deficit of \$238,356 as compared with a surplus in 1892 of \$744,660. The deficit for the Oregon Railway and Navigation system was \$199,459 in 1893, compared with \$1,564,441 in 1892.

—There are twenty-one firms in the lumber combine, and of the mills in the combine but nine are idle. There is a little advance in the price of clear and surfaced lumber, which is quoted at \$22 per M.; rough lumber, \$14. President Gray of the association says: "The consumption of redwood lumber in 1893 amounted to 240,000,000 feet. This includes all the material which left the mills. This being a dry year, we figure on a somewhat smaller demand. We have agreed to cut for the year 200,000,000 feet, and if there is any more needed we will supply it. You understand there is no desire to limit the supply and hull the market. We merely do this to prevent the market from being overstocked. Lumber has been selling at ruinous rates, and it would continue to do so if some restriction were not put on the output. The Navarro mill put out last year about 20,000,000 feet of lumber, the result being that it is now in the hands of the Sheriff. They had 500 men living there, many of whom had their families. All of the men had to go, and many of them are journeying eastward in the ranks of the unemployed. We wish to avoid any such end as this."

—The Bradstreet Mercantile Agency reports 11 failures in the Pacific Coast States and Territories for the week ending Friday, as compared with 16 for the previous week and 21 for the corresponding week of 1893. There were 91 failures in the Pacific Coast States and Territories for the month of March, with assets of \$270,366 and liabilities of \$453,947, as compared with 106 for the previous month, with assets of \$399,080 and liabilities of \$640,658, and 71 for the corresponding month of 1893, with assets of \$416,143 and liabilities of \$542,535. The failures of the past month are divided among the States and Territories as follows:

	No.	Assets.	Liabilities.
California	74	\$236,966	\$384,447
Oregon	8	12,600	25,800
Washington	9	20,800	43,700
Totals	91	\$270,366	\$453,947

The following are the causes assigned for the failures: Incompetency, 26; inexperience, 8; inadequate capital for the business undertaken, 46; injudicious crediting, 3; neglect of business and bad habits, 2; excessive competition, 1; unfavorable circumstances, floods, fires, etc., 4; fraud, 1.

MINING SHAREHOLDERS' DIRECTORY.

COMPILED EVERY THURSDAY FROM ADVERTISEMENTS IN THE MINING AND SCIENTIFIC PRESS AND OTHER S. F. JOURNALS

COMPANY AND LOCATION.		NO. AMT. LEVIED, DELINQ. AND SALE.		SECRETARY.	
Andes S M Co, Nevada	42	25c	Mar 6, April 10, April 28	John W Torgas, Nevada Block	
Belcher S M Co, Nevada	18	15c	Mar 15, April 17, May 3	E Perkins, Mills Bldg	
Bodie Cons M Co, California	17	15c	Mar 10, April 16, May 14	E Willis, 414 California	
Caladonia G M Co, South Dakota	18	50c	Mar 8, April 10, May 10	F G Drum, Mills Bldg	
Challenger Cons M Co, Nev.	16	70c	April 3, May 8, May 29	O L McCoy, Mills Bldg	
Chollar M Co, Nevada	3	20c	Mar 21, April 14, May 18	Chas E Elliot, Nevada Block	
Cibola Cons M Co, Cal.	4	50c	April 4, May 14, June 2	O E Gunn, Mills Bldg	
Crocker Cons M Co, Nevada	4	5c	Mar 6, April 10, April 28	A W Havens, Nevada Block	
Crown Point G & S M Co, Nev.	61	25c	April 23, May 28, June 18	Jas Newlands, Mills Building	
East Sierra Nevada M Co, Nevada	3	7c	Jan 10, May 18, June 8	Geo R Spencey, 218 Pine	
Edwards Mining Co, Cal.	3	3c	April 11, May 12, June 2	Otto Otto Sader, 218 Pine	
El Leopoldo G & S M Co, Mexico	6	10c	Mar 22, May 10, May 31	Jabez Howes, 214 Pine	
Evening Star M Co, Cal.	13	11c	March 27, May 3, May 24	J Scott, e, 320 Sansome	
Everett Star M Co, Cal. (2)	1	1c	March 8, April 18, May 4	M G Loeffer, 137 Montgomery	
Golden Trize M Co, Nev.	2	2c	April 23, May 26, June 73	O D Bennett	
Gray Eagle M Co, Cal.	36	3c	April 24, May 23, June 19	C O Hare, Pier 6	
Jacharabitt M & M Co, California	6	2c	Mar 22, Apr 24, May 11	J F Holling, Crocker Bldg	
Osborn Hill M Co, Cal.	2	25c	April 4, May 7, May 28	R R Grayson, 331 Pine	
Overman S M Co, Cal.	70	10c	Mar 6, April 10, April 30	Geo D Edwards, 414 California	
Pine Hill G & S M Co, Cal.	4	5c	April 13, May 15, June 3	D A Jennings	
Potosi M Co, Nevada	41	25c	Mar 6, April 16, May 2	Chas E Elliot, Nevada Block	
Savage M Co, Nevada	83	25c	Mar 6, April 9, April 39	E B Holmes, Nevada Block	
Scorpion M Co, N. Va.	5	5c	Jan 10, April 13, May 4	Geo R Spencey, 218 Pine	
West Cons. Cal. & Va., Nevada	2	25c	April 10, May 12, May 31	P H Andross, 324 Pine	

MEETINGS.

COMPANY AND LOCATION.		MEETING. SECRETARY AND OFFICE IN S. F.		DATE.	
Con Amador Volcano Hyd'ic G M & Land Co, Cal.	Annual	M Oasey, 508 California		May 2	
Cou Imperial M Co, Nevada	Annual	E L McCoy		May 7	
Golden Trize M Co, Nev.	Annual	R E Kelly, 309 Montgomery		May 7	
Morgan Mining Co, California	Annual	L C Bresse, 230 Montgomery		May 5	
Moss Hill M Co	Annual	D A Jennings		May 9	
New York Gold Hill M Co	Annual	D A Jennings		May 9	
North Star M Co	Annual	D A Jennings		May 9	
Original Empire M & M Co	Annual	D A Jennings, 401 California		May 9	
Tuile G M Co	Annual	J B Henghes		May 7	
Virginia Cons Mining Co, Nevada	Annual	A F Benard, 26 O'Farrell		April 30	

DOUBLE ACTING CORNISH PLUNGER.

PUMPS TWICE AS MUCH WATER AS THE OLD PLUNGER. Only about one-third the weight of the old plunger. Special construction of steel for packing on mules, only one-twelfth the weight of the ordinary plunger. First outlay one-third less, works with 10 per cent less power.
IMPROVED SINKING PUMP.—Buckets and clack changed under water. Bucket lasts six times as long as the old one, saving expense of putting down another pump where bucket and clack cannot be changed under water. The self-lightening and self-lubricating stuffing box and new bucket also saves expense of dropping extra pumps.
WM. NANCE, Grass Valley, Nevada County, California.

Board Sales of Mining Stocks.

S. F. Stock Board.

THURSDAY, April 26, 1894.

9:30 A. M. SESSION.

700 Alta	35c	100 L Wash	5c
300 Andes	65c	400 Mexican	1.50
400 Belcher	1.50	200 Mono	.40c
200 Bodie	1.50	100 Nev. Q.	.5c
350 Best & Belcher	1.85	700 Ophir	3.00
200 Bullion	.41c	100 Potosi	3.55
250 Crown Point	.40c	Overman	.27c
400 C. & V.	4.50	300 Justice	.23c
850 C. & V.	4.35	600 Mexican	1.70
100 C. & V.	4.30	300 Mono	.37c
100 Bulwer	.13c	200 Seg Belcher	.37c
300 Crown Point	.55c	100 Seg Belcher	.25c
600 C. & V.	1.35	100 Yellow Jacket	.69c
300 H & N	.71c	500 Union	.70c

2:30 P. M. SESSION.

100 Alta	35c	100 Iowa	.13c
500 Andes	65c	600 Justice	.23c
200 Andes	.63c	400 Mexican	1.70
1300 Belcher	1.50	300 Mono	.37c
3150 B & B	2.00	800 Ophir	3.70
400 Bodie	1.50	100 Potosi	.31c
200 Bullion	.41c	600 Potosi	3.55
100 Bullion	.41c	600 Potosi	3.55
400 C. & V.	4.50	300 Justice	.23c
850 C. & V.	4.35	600 Mexican	1.70
100 C. & V.	4.30	300 Mono	.37c
100 Bulwer	.13c	200 Seg Belcher	.37c
300 Crown Point	.55c	100 Seg Belcher	.25c
600 C. & V.	1.35	100 Yellow Jacket	.69c
300 H & N	.71c	500 Union	.70c

Sampling Works for Sale.

The works are situated at Daggett, Cal., in the Calico Mining District, and on side track of the Atlantic & Pacific Railroad. They contain a first-class 60-horsepower engine and 46-horsepower boiler, with ore-crusher and other machinery, Mill Scales, Assaying Outfit, etc., all nearly new. Also upon the premises an office building, a comfortable dwelling-house (portable). The above can be had at a bargain. Apply to JOHN H. GILLESPIE, 1014 Stockton St., San Francisco.

20-Stamp Mill for Sale.

In Southern California, a 20-stamp Gold Quartz Mill, with engine, boiler, self-feeders, rock-breaker, etc. As the premises are adjacent to Railroad, the Mill could be conveniently removed. Can be had at low price for cash. Address: "Quartz Mill," care MINING AND SCIENTIFIC PRESS, San Francisco.

Complimentary Samples.

Persons receiving this paper marked, are requested to examine its contents, terms of subscription, and give it their own patronage, and, as far as practicable, aid in circulating the journal and making its value more widely known to others, and extending its influence in the cause it faithfully serves. Subscription rate, \$3 a year. Extra copies mailed for 10 cents, if ordered soon enough. If already a subscriber please show the paper to others.

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And All Kinds of MACHINERY.



Cal. Debris Commission Notices.

THE CALIFORNIA DEBRIS COMMISSION having received applications to mine by the hydraulic process from Geo. A. Debris in the Nevada mine, near Gilsonville, Sierra county, to deposit tailings behind log and brush dams in a ravine; from John Egbert in the Nooday mine, near Sierra O. Y. Sierra county, to deposit tailings on flat ground; from Douglas Perkins in the Cleveland mine, near Sierra, Sierra county, to deposit tailings behind a log dam in Rock creek; from John Eyrand and Jean Lazzer in the Indian Hill mine, Plumas county, to deposit tailings in a depression behind a rock dam; from Dubra, Wilder & Co., in their mine in the Nip and Truck mines, near Barger, Butte county, to deposit tailings behind a dam in Robinson ravine; gives notice that a meeting will be held at Room 92, Flood Building, San Francisco, Cal., May 1, 1894, at 1:30 P. M.

Practical Hydraulics.

A Book for Civil Engineers, Miners, Millmen, Hydraulicians, Mining Engineers, and Irrigators.

By P. M. RANDALL.

This new work is by one of the most experienced hydraulicians of the country. It is a volume of useful tables for ready reference, in which the results of accurate calculations are all placed in a form so that one can find what he wants in a moment. For the engineer the principles, formulae, coefficients, etc., are given; and for those not familiar with higher mathematics, examples, rules, and tables are prepared. Thus the needs of the scientist and the practical miner or millman are both met. It is the most complete work on the subject yet published, and is specially applicable to the Pacific Coast.

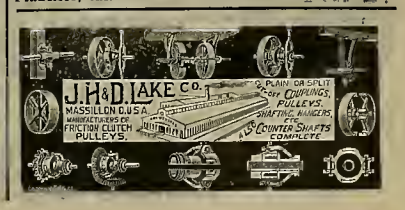
Table of Contents.

The following brief abstract of the contents will give an idea of the branches of the subject treated:
General Plan; Discussion of the Principles of Hydraulics; Rules Deduced from Formulae Obtained; Examples and Calculations; Extensive Tables for Ready Reference; Fundamental Laws of Hydraulics Demonstrated and Expressed in Formulae and Rules; Flow of Water through Openings; Weir Coefficients; Triangular Weirs; Flow of Water Over Quadrant Weir (tabulated); Application of Tables; Submerged Orifices; Flow through Orifices in Thin Partitions; Tables and Applications; Miners' Inches; Tables and Calculations; Flow of Water through Short Tubes and Compound Tubes; Flow of Water through Pipes; Tables of Velocities and Cubic Feet Flow for Given Fall per Mile and Diameter of Pipe; Coefficient for Bend—Circular and Angular; Flow through Nozzles; Inverted Siphons; Flow of Water in Open Channels; Extensive Tables; Rough and Ready Notes; Hints for Speedy and Approximate Estimates, etc.
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This new and important book is on the use and construction of sluices, flumes, dams, pipes, and water on heavy Grades. Methods of mining shallow and deep placers, history and development of mines, records of gold washing, mechanical appliances, such as nozzles, hurdy-gurdies, rockers, undercurrents, etc.; also describes methods of blasting; tunnels and sluices; tailings and dump; duty of miners' inch, etc. A very practical work for gold miners and users of water. Price, \$5, post-paid. For Sale by DEWEY PUBLISHING CO., 220 Market St., San Francisco, Cal.



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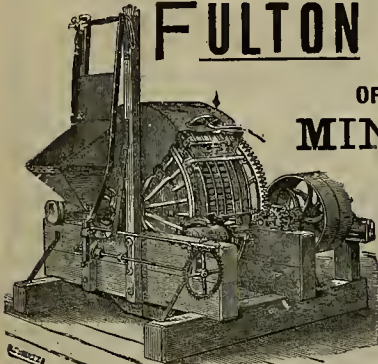
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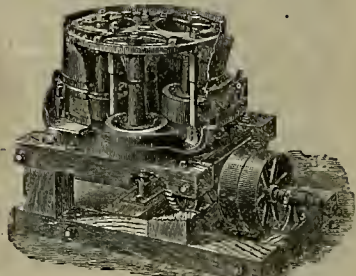
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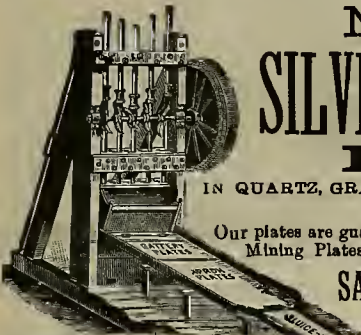
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EMBRACING IN ITS VARIATIONS OF CONSTRUCTION AND APPLICATION

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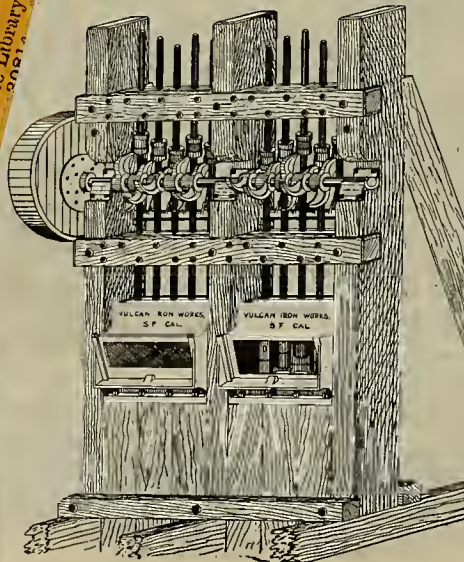
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An Illustrated Journal of Mining, Mechanics and Popular Science.

VOLUME LXVIII. Number 18. SAN FRANCISCO, SATURDAY, MAY 5, 1894. Three Dollars per Annum. SINGLE COPIES, 10 CENTS.

A Southern California Enterprise.

In common with other parts of the State the progressive element in southern California recognizes the need of utilizing electrical force in developing natural resources, the idea being to secure the maximum of power at the minimum of cost.

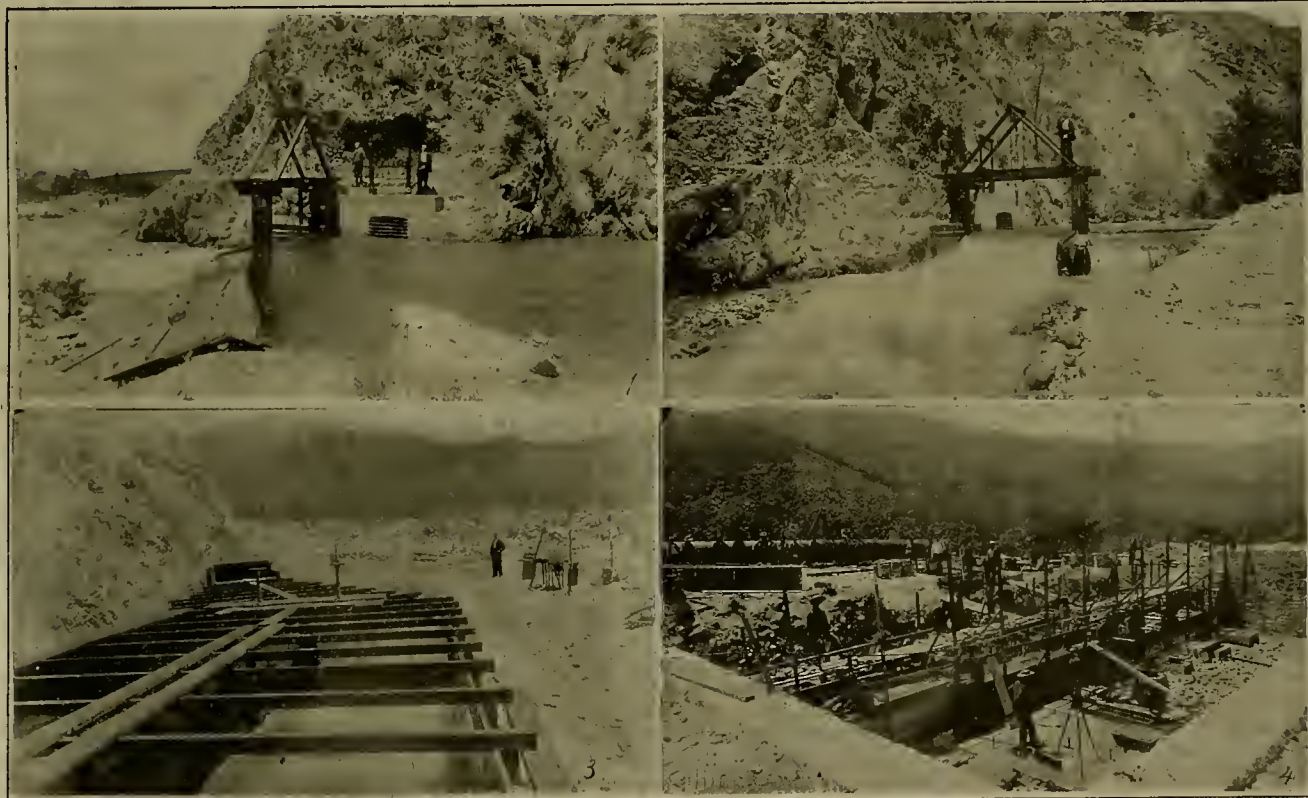
The highest mountain range in the southern part of the State is just northeast of Redlands, and down the steep slopes flows abundant water, giving great chance for developing electrical power. The Redlands Electric Light

Drift Mines at Deadwood.

Every mining State and almost every mining county has its Deadwood mining district. More often than otherwise it is a good mining district. Placer county is no exception in either respect. Deadwood is a small drift-mining locality, situated on the divide between two of the tributaries to the middle fork of the American river, seven miles northeast of Mich'gan Bluffs. Through the summit of the divide cross diagonally the buried channels of some of the ancient rivers so extensively and profitably mined

The Silver Question in Japan.

Japan is as interested in the world-wide silver question as England or the United States. That country is on a silver basis, and the rise in the purchasing power of gold is as manifest in the island empire as elsewhere. Recent letters from there say that a dollar sent there buys two dollars' worth. Frank Carpenter writes: "I made out a draft of \$100 on my New York letter of credit at the bank this morning and got \$208 for it, and the money I have brought with me has doubled in value. This makes trav-



1-Headgate Looking West.
2-Headgate Looking East.

HEADGATES OF REDLANDS ELECTRIC POWER COMPANY.

3-Sand Box.
4-Power House.

& Power Co. organized with a capital stock of \$200,000, and started work in Mill Creek canyon. A tunnel 168 feet in length and 7250 feet of steel pipe brought the water to the power house, where the requisite machinery enables the company to utilize 3000-horse power. Our illustration gives a general idea of the headgates, etc.

Such enterprises are what go to make a State. The man who made two blades of grass grow where but one grew before used to get the applause which is now bestowed on the man who makes work for five men where before there wasn't work for one.

The company supplies Redlands and Mentone with light, the Union Ice Co. with power, and is prepared to furnish cheap light and power to manufacturing enterprises locating in that vicinity. Mr. F. G. Ferand is the efficient secretary of the company, to whom inquiries may be addressed.

THE "gold reserve" has again dropped below the hundred-million mark. It is now a question, Will Secretary Carlisle issue another bond call for a \$50,000,000 loan? There is little to the gold reserve beyond ancient and dusty tradition, but it serves a purpose which has been worked for all it is worth.

for gold in Placer and other counties. Prominent among these is what has been known as the Devil's Basin channel, which, 25 years ago, was mined down stream as far as drainage could be had, and yielded a very large amount of gold. The outlet and continuation of this channel on the west side of the ridge has been prospected for during many years and is now believed to have been found. The owners of the Clifton mine, Messrs. Dixon and McCarty, are the fortunate individuals. The channel mined so profitably in the Center mine has turned and enters the Clifton, through which it can be traced by the rims, and he identified as the old Devil's Basin channel. Where it enters the Clifton, the channel is about 60 feet wide; it is in soft bed-rock, with four to eight feet of gravel under a cement roof. In the Clifton the conditions for mining will be very favorable, and a tunnel now being pushed will soon reach pay. Once again mining in this channel, Deadwood will regain some of its old-time importance as a gold-producing camp.

TEN MILLION DOLLARS' WORTH of gold bullion was shipped last week from the New York Assay Office to the Philadelphia Mint to be converted into coin, which makes \$50,000,000 recently received in that city from New York.

eling comparatively cheap, and although I have been paying four dollars a day at the Grand hotel in Yokohama it really costs me only two."

A foreigner, resident in Japan, with a \$3000 annual income, really gets \$6000, so far as the purchasing power of each dollar is concerned.

Of course this cannot continue, for the equalizing forces of natural law will sooner or later work the same way there as farther east and west, but for the present the income-receiving class are "in clover."

MINING capitalists and metallurgical experts have held a meeting in Denver to talk over the merits of different methods for treating Cripple Creek, Col., low-grade ores. The question resolved itself into a choice between the cyanide process or the chlorination process. It is reported that the leaning of the majority is toward the latter. The statement was made that the ore could be treated at a cost of \$4.50 per ton, and with a saving of over ninety per cent.

THE question is asked: "Why is England so determined in its exclusive gold policy?" The answer is simply this: England produces no silver.

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San Francisco, May 5, 1894.

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WHETHER for good or ill it is evident that party politics will figure in the fight for the remonetization of silver. Thos. Carter has an article in a current magazine wherein he says that the next Republican platform will have a plank demanding the restoration of bimetalism. As Mr. Carter is chairman of the National Republican Committee he evidently speaks authoritatively.

SAYS the *Coal Trade Journal*: "Circulation is not always a good criterion of the advertising value of a paper. A medium may bring bushels of replies but no sales. A 'fake' paper of enormous circulation may do for a penny advertiser, but it will not pay one who must have more than five dollars to make a sale. A well-recognized trade paper 'right in line' may bring but one reply, but that one may make a sale involving thousands of dollars."

J. W. GRACE & Co.'s crude oil experiment appears to be so far a success. They recently fitted up a steamer—the Bawnmore—with tanks and sent her to Payta, Peru, where the crude oil from forty-nine wells, six miles in from shore, was piped into the vessel, carrying 840,000 gallons. The trip was satisfactory, and Grace & Co. have the credit of inaugurating a new industry. The city gas companies will take all the crude oil brought here. Oil from the Payta district is almost universally used for fuel in every part of Peru.

THE Cooxey movement which thundered in the index proved a fiasco. Cooxey got to Washington, D. C., last Tuesday with 500 of the 500,000 that he was going to lead. He and his lieutenant, Carl Browne, tried to address the crowd on the steps of the National Capitol, but he was compelled to leave the grounds, while Browne was taken to jail. So those who expected that the next gale that sweeps from the East would bring to our ears the clash of resounding arms must wait a while for the sounds of conflict. The whole thing illustrates general popular discontent; but the probability of serious present trouble is greatly lessened by the result of last Tuesday's demonstration.

THE industrial features of the week have been the collapse of the Cooxey movement, the settlement of the strike on the Great Northern Railroad, and the widespread continuance of the strike of the coal miners, with considerable attendant violence. Over 130,000 coal miners have struck—about 50,000 in Pennsylvania, the rest in Ohio, Illinois, Alabama, Tennessee, Kentucky, West Virginia, Indiana and Iowa. The strike is a protest against last year's reduction in wages. It will last, probably through the month, with the usual result. The strike is only in the bituminous coal districts, and the anthracite coal trade contemplates the situation with great cheerfulness.

Different Only in Terms.

The commanding value of gold is strikingly illustrated in all revolutions, or crises, when it always appreciates in value; that is, in purchasing power. Thirty years ago, when there was a grave conflict, it increased in value, that value being then expressed by its being sold at a premium, a dollar gold being worth \$2.35 in the currency then circulating.

There is as great a conflict now going on; there are no uniformed armies, no generals on horseback, nor pomp and circumstance of battle array, but the fight is on and is as distinctly manifest as the war of '61-'65. That was "a civil war;" this is a national one. As then, so now; gold has increased in value; so far as gold is concerned the situation differs only in terms. Gold is not quoted at a premium as thirty years ago; the tilt is the other way, and that which gold buys is reduced in price. The effect, however, is precisely the same. The present rise in gold is registered in the fall in the prices of real estate and staple articles.

The Republic Only an Opportunity.

It would seem that a good deal that is written in newspaper offices about "the Industrial Army," and set in type, and read by the wise and otherwise, is based on a wrong conception of the facts. A large proportion of editorial statement concerning the Cooxeyites shows considerable confusion regarding equality. People often get mixed up on "equality." There is political equality for everybody; that is the broad basis upon which we do business as a government; but that does not involve nor include personal or social equality. This republic of ours is not an invention for raising or reducing all men to a level. It is not a commune nor a brotherhood; it is an opportunity to let all men find their own level. They do it, and that's the chance this government gives. That is its merit, its value; as long as it does that it has reason for existence; when it ceases to do that it has not. It is doing that now, in spite of all its foes and many of its friends who are well meaning enough, but who argue on current troubles from a mistaken standpoint. Sincerity in these matters is not enough; a little understanding of the facts is requisite.

British Hopes.

The London *Mining World* of April 14th gives an account of the Lead Hills Silver-Lead Mining Company's annual meeting; a verbatim report of the proceedings. It transpired that the only thing that prevented the company from making a profit during the year was the low price of lead. When asked what the outlook was for higher prices the chairman said that there was some hope; that the Congress of the United States was about to pass a tariff bill that would take off about fifty per cent of the present duty on lead, and that would be a great help. He hoped that bill would be passed in the autumn. This statement was received with "cheers."

Then the secretary made a speech. He said "the last quotation of lead be had seen in the New York papers was \$3.40, which was equivalent to £15 17s 4d in English money. If a reduction were made in the import duty of one cent it would mean a reduction of £4 13s per ton. This sum, deducted from the £15 17s, left £11 4s, whereas the present quotation in England was £9 7s. So that if the lead were allowed to go freely into America there was a very good chance of a substantial rise." Then they cheered some more.

It certainly must be a cheering thought to the gentlemen at Washington charged with legislating for the interests of this country, that, though such legislation may take bread out of the mouths of American citizens, yet its effect will be to make wider markets and greater profits for the British mine-owners, whose hopes seem justified by the circumstances.

The "Battle-Born State."

'Twill be thirty years on the 31st of next October since Nevada was admitted into the Union. The admission was done in a hurry, the enabling act being telegraphed from Washington to Carson. The haste was occasioned by the desire to have Nevadans legally participate in the Presidential election which ensued the following week, and in which it was deemed necessary to have Nevada's three electoral votes.

Eastern papers indulge in slurs and sneers concerning Nevada's dwindling population, forgetful of the days when it was the backbone of the North's finances, turning in hundreds of millions of gold and silver. San Francisco, too, owes at least grateful remembrance to the State that enriched so many of its citizens, and so long enabled California to have four United States Senators. But though

the glory of Nevada belongs almost wholly to the past, she has wealth apart from that concealed in her crags. Her area of over 110,000 square miles comprises great tracts that only need irrigation to produce fruitful crops, and while the output may aggregate less in value than the mining yield for many years, yet there is a permanence to the pursuit that will turn the tide of wealth toward that State instead of away from it.

It is a noticeable fact that the finances of Nevada are in better shape to-day than those of any other State in the Union. The irreducible school fund of the State is nearly \$1,800,000. In many of the counties there is more money than is needed in the county treasury, and the mercantile failures make the smallest item in the Dun or Bradstreet lists.

Exports of Gold.

The exports of gold from this country to Europe from January 1st to March 22d have exceeded the imports during the same time by \$5,087,820. The causes of this exportation, says *Rbades' Bankers' Journal* for April, have been in part to pay debts abroad, because it was, owing to the conditions of trade, cheaper for American merchants to remit specie than to buy foreign exchange, but chiefly because there has been a slight premium paid for it by European gold importers. This premium has been paid to supply the gold for investment in the gold bonds of foreign governments—Austria, for instance, desiring to place its financial system upon the gold basis. The government selling the bonds makes a contract with a syndicate of bankers, giving them a certain percentage for commissions and expenses. These bankers find they can afford to give shippers here a portion of this commission for the gold, and thus in reality offer a premium. It is readily seen how exports would take place under these circumstances when the price of foreign exchange would seem to preclude them.

But while these are valid reasons for the export, it seems rather hard to explain why the exportation of gold should continue in the face of such a large excess of our merchandise exported, during the past eight months amounting to \$218,000,000. The truth is that, owing to the defects in the financial system of the United States, gold is made cheaper here than in other countries, and the financial depression has so piled up the reserves in the money centers as to glut our money markets. Our money markets affording no opening for much of this surplus, the banks and others who are looking for safe placement of it, direct their eyes abroad for opportunities in Europe. Silver dollars, silver bullion and paper money will not be taken there, and consequently the gold itself goes whenever wanted. That a still larger amount has not gone is due to the large exportations of merchandise mentioned, and also to the fact that there is no such scramble for gold as is assumed by many. At the best, gold is an expensive thing to handle and to keep. It brings no interest directly; its only purpose is to form the foundation of the financial systems of the civilized nations. Just as little as is requisite for that purpose will be taken and held by any sensible nation.

There is no country to-day from which it is easier for foreign nations to draw gold if they want to than from the United States. The large amount of paper currency redeemable in gold enables any one to obtain the metal from the Treasury whenever there is any profit in doing so. The Bank of England holds the main gold reserve in England, and the Bank of France in France. These banks are in much better condition and employ more means to prevent their gold being drawn out than the United States Treasury can, under present conditions, employ. The banks mentioned raise the discount rate whenever their reserves of gold seem to be liable to too severe drafts. They can thus, to a certain degree, change the relations of business so as to render dealings in gold unprofitable. The United States Treasury, while it has all the features of a bank of issue, has none of the loaning powers of a bank which enable it to control business in a way to protect itself. It must pay out gold whenever demanded, and if the revenues upon which a new supply depends, are reduced, it has no other resource but to borrow. We do not mean to say that the gold for export is taken always necessarily from the Treasury. It is often directly furnished by the banks. But the banks very well know that whenever their supply runs low they can, with their large reserves in paper money, replenish their supplies from the stock in the Treasury.

THE publisher of the *Puget Sound Lumberman* is reported to be in the peculiar business of running a lumber paper, and also in the shingle business, quoting prices at 20 per cent below association rates, thus coming in competition with his advertisers. The result of the experiment will be interesting.

General Mining Notes.

DIRECTOR OF THE MINT PRESTON wants the Carson Mint removed to Denver.

ONE THOUSAND men are prospecting for gold on the eastern slope of the Nicaraguan Andes.

EIGHT THOUSAND tons of gold have been mined throughout the world during the present century.

THE Mayflower Mining Company has put in a bid of \$12,000 for the Kling estate property in Amador City.

THE Monitor and Jim Crow mines, in the Ferguson district, Nevada, have been sold to J. R. Delamar of Idaho for \$150,000.

THE Napa Consolidated Quicksilver Mining Company paid a quarterly dividend of 10 cents per share, or \$10,000, last week.

THE Boise Mining Company will operate a Bucyrus gold-saving machine in the placers of Moore's creek the coming summer.

THE Alaska-Treadwell Mining Company has paid a quarterly dividend, at the rate of 37½ cents per share, amounting to \$75,000.

THE Copper Queen Co. will extend its line from Fairbanks to Benson, Arizona, and thereby acquire adequate transportation facilities.

THE United States Supreme Court has denied the petition asking for a hearing of the Amy-Silversmith and Non-Consolidated mining cases.

MONTANA has produced nearly one-third of the gold, silver, copper and lead in the United States. The mines of the State have yielded over \$400,000,000.

THE Boston and Colorado Smelting Company has decided to rebuild the recently burned smelter at Butte, Mont., with a capacity to heat 150 tons of ore daily.

WHILE drifting in the Hidden Treasure mine at Folsom an old abandoned tunnel was found, the timbers in which were rotten. A cave would carry away the railroad track and a large brick freight depot.

THE antimony ore produced from the mines in Bernice district, Churchill county, Nevada, brings \$50 a ton in this city. It is sold for \$25 a ton on the dump. Ten years ago antimony sold for 30 cents a pound—\$600 a ton.

A NUOGET of tin has been discovered in the mines of North Dondas, Tasmania, estimated to weigh 5400 pounds. The assay of a small piece shows that the large mass of ore contains 67 per cent of metallic tin.

THE Calumet and Hecla Copper Mining Company of Michigan has declared a dividend of \$5 per share, amounting to \$500,000, the largest sum now disbursed in a single dividend by any mine in this country, payable May 15th.

THE Anstin (Nevada) *Reveille* learns that the Jenkins mill at Kennedy is only capable of reducing about six tons of ore in 24 hours; that by the present process the mill is not able to save the gold, and that the tailings assay from \$5.50 to \$10 per ton.

CHARLES J. ELLIS has instituted a suit against Frederick Frankenthal asking the Superior Court to prevent said defendant from disposing of the Gambetta quartz mine in Madera county, alleging that he is the owner of said mine.

ONE HUNDRED AND FIFTY miners in the employ of the Delamar Mining Company at Delamar, Idaho, have gone on strike on account of a reduction of wages from \$3.50 to \$3 a day for miners and of carmen from \$3 to \$2.50 a day. The works are closed down.

THE "Red Oxide" location in White Cloud mining district, Humboldt county, Nevada, is on a heavy outcrop of iron and copper, forming the peak of a lofty mountain. Miners say it is the capping of an extensive copper body which will be encountered at a vertical depth of 400 to 600 feet. Some very poor mining has been done on that property.

THE Boston and Colorado Smelting Company has declared the usual quarterly dividend of 2½ per cent, payable immediately. The extra dividend in April for the past three years is omitted this year because of the business depression in Colorado. This extra dividend was 10 per cent in 1893 and 1891, and 7½ per cent in 1892.

CONGRESSMAN MAYEE is confident that his compromise proposition on the silver question will pass the House, notwithstanding the adverse action of the Coinage Committee. Meyer proposes to get his compromise direct before the House as a substitute to the free-coinage bill. Bland says he does not think the Meyer bill will be germane as a substitute for free silver, owing to the bond feature.

A STATEMENT of the value of the mineral products of Canada for the past year shows an aggregate of \$19,250,000, or \$250,000 less than that of 1892. Nickel heads the list, the output having been 33,392,892 pounds, valued at \$2,078,351. The value of gold was \$927,244; copper, \$875,864; silver, \$321,423. There were mined 3,700,000 tons of coal, valued at \$8,422,269. The quantity of iron ore mined is placed at 124,702 tons, valued at \$298,081.

P. T. FARNEWORTH, general manager of the Horn Silver mine at Frisco, Utah, says he will start at once with the erection of new works to take the place of those destroyed by fire, and a new hoist and a new concentrator will be built, with new and improved machinery. He estimates the cost of the plants at \$125,000, and says that shipments will be resumed from the mine. They expect to ship about 800 or 1000 tons of ore per month.

THE Chicago Gold Mining and Milling Company, with a capital stock of \$200,000, has been incorporated at Baker City, Oregon. The principal office of the company is to be in Baker City, and the following officers and board of directors have been elected: President, W. H. Hackney; secretary and treasurer, J. C. Anstin; general superintendent, L. Durkee; directors, W. H. Hackney, J. C. Austin, P. Basche, J. L. Rand and L. Durkee. The basis of operations of the company will be in Sparta district, Union county, Or., where the company owns a group of nine claims.

A STORY is going the rounds, says the Wahsatch (Utah) *Wave*, about some Midway prospectors, worth repeating. The boys went out to Mercur some time ago to search for gold. They roamed over the hills picking up samples here, there and

everywhere, which they brought home to Midway. In looking over their specimens after arriving at their destination they found one piece that looked much better than the others and sent it to Provo for assay. The returns showed that the rock reached up into the hundreds in both gold and silver. They were so much encouraged that they hitched up and started right back for the new El Dorado. After spending a couple of weeks in a vain endeavor to locate the hidden treasure they again returned to the humble vocation of tilling the soil.

General News Notes.

FOURTEEN FEET of snow fell in Alaska last year.

FIRE destroyed a large part of Challis, Idaho, last Sunday.

THE Wilson tariff bill will not be passed before September, if at all.

THE increase in the public debt for the month of April was \$1,100,971.

THE World's Fair stockholders are to be paid a 10 per cent dividend.

THE Portland, Or., mayor has the appointment of 400 municipal officials.

THE St. Charles hotel, at New Orleans, was burned to the ground last Sunday.

OVER \$5,000,000 in gold was shipped to Europe from New York during the week.

A CHINESE RESTAURANT furnishing 15-cent meals is the latest at Nevada City, Cal.

CRANKS are writing letters to the President, threatening to blow him up with dynamite.

OUT of 1292 answers to letters sent to Kansas farmers asking if farming paid, 1251 answered "no."

THE entire California Congressional delegation are unanimous in favoring the Nicaragua canal.

ALL the unemployed in this State who organized into the "Industrials" have marched eastward.

THE Portland, Or., Commercial Savings Bank, which suspended last July, has resumed business.

SANATOA PAFAR has a bill in the Senate forbidding any one person to own more than 100 acres of land.

LONDON'S industrial exhibition opens to-day. A copy of the famous Ferris wheel is one of the attractions.

A PHILADELPHIA MAN dropped dead at a poker game last Saturday. He held four aces and joy killed him.

THE bonded debt of the Pacific railroads, together with interest due the United States, amounts to \$130,000,000.

THE division of the reward for Chris Evans' capture gives Gard's posse \$3000, and Hall, Witty and Perkins \$2000.

IT is proposed to build an electric railway between New York and Washington that will travel at the rate of 200 miles an hour.

CHEEKEE INDIANS will divide the \$8,000,000 received from the sale of Strip bonds, each man, woman and child getting \$600.

WITH a silver pick President Diaz finished last Sunday the opening from end to end of the seven-mile tunnel out of the Valley of Mexico.

THE People's Home Savings Bank of this city has been declared insolvent. It took nearly a year's time and cost \$92,000 to attain that result.

SENATOR VOORHEES of Indiana swears by all that is high and holy that the income tax will stay in the tariff bill and conjures all and sundry not to forget it.

SOME one with very little to do has figured that there have already been uttered in the debates of the present session of Congress more than 20,000,000 words.

THE American Federated Trades and the Knights of Labor will endeavor to consolidate at a meeting to be held June 11th in some city to be determined upon subsequently.

THE Secretary of State for India, replying to recent Parliamentary questions, said that the statement that the Government intended to reopen the India mints is entirely unfounded.

CAAMP, the Philadelphia shipbuilder, has asked the English Government's permission to bid on the construction of the new British war cruisers, and old England is aghast at Yankee impudence.

THERE are \$455,000,000 in the forty-one savings banks of New York and Brooklyn, held by more than 1,000,000 depositors. The capital of all the national banks in the country is only \$700,000,000.

WILLIAM R. HEARST, of the *Examiner*, is to do away with his Bureau of Claims at Washington, and brings suit against John Wedderburn, who, he says, has run the bureau in debt and failed to render account.

THE statement is made that a damaged silver dollar, of full weight, will bring the owner 43 cents. The officials of the National Bank of Savannah have been told so by the superintendent of the Philadelphia Mint.

GEORGE K. FITCH has filed a bill of revivor praying that a receiver be appointed to take charge of and sell the *Call* and ten days subsequently the *Bulletin* at public auction or at private sale to the highest bidder for cash.

THE twenty-year-old controversy over 178,000 acres of land, valued at \$750,000, claimed by the California Railroad Company and the Oregon Central Company, has been submitted to the United States Circuit Court of appeals for decision.

THE regular monthly statement of the Director of the Mint shows the coinage executed at the United States Mints during the month of April, 1894, to have been as follows: Gold, \$10,184,000; silver, \$554,000; five-cent pieces, \$22,500; total coinage, \$10,750,000.

SEIGNIORAGE may be defined as the profit, exclusive of cost of manufacturing, between the cost of bullion used and the price at which the coin is issued, after deducting the loss of bullion in the process of coinage. Thus, 1000 ounces of silver at say 64 cents per ounce in gold, would be \$640. This will coin 1292 pieces, upon which the seigniorage will be \$652, less the loss of

bullion in the manufacture, say about \$6, making \$646. The cost of manufacture of 1292 pieces is \$39, thus making a net seigniorage of \$607, upon an expenditure of \$640 in gold for 1292 silver dollars.

SEVEN THOUSAND rioters at Cleveland, Ohio, smashed up several manufacturing establishments in that city during the week. The mob was mostly foreigners—Dagoes and Poles—and the sole reason and purpose was a desire to plunder and destroy. The State troops are prepared to check further trouble.

THE big tie-up on the Great Northern is off, and the entire system resumes work. St. Paul, Minneapolis, and the A. R. U., were too much for President Hill. Mutual concessions and arbitrations have raised the blockade, and the 4500 miles of track and the attendant industries will again assume active operations.

THE Treasury statement issued on the 1st shows that during the last month the receipts aggregated \$22,692,364, and the disbursements during the same period \$32,072,838. The receipts for the ten months of the present fiscal year are shown to have been \$245,809,749, and the disbursements \$311,357,196, leaving a deficit for the ten months of \$65,447,447.

THE estimates by the Director of the Mint of the silver product of the United States for 1893 give a total of \$60,000,000, as against \$74,995,000 for 1892. Increases are shown in Alaska, Arizona, California, Colorado, Idaho, North Carolina, South Dakota, Texas and Washington, while in all the other States and Territories the figures show a decrease of production.

THE International Bimetallic Conference began its sessions at London last Wednesday, and is attended by many prominent financiers. The four hundred delegates are unanimous in the desire to maintain the ratio between gold and silver under an international agreement. Arthur Balfour, the Conservative leader in the British House of Commons, declared the best safeguard against impending danger was the remonetization of silver.

COXEY and his 500 "Industrials" marched to the National Capital grounds at Washington, D. C., last Tuesday. CoxeY tried to speak, but was hustled out of the grounds and afterwards arrested. Carl Browne's attempt to make an address resulted in the police taking him to jail. The other detachments of the "army" are scattered in various parts of the country. The Knights of Labor say the railroads must transport Kelly and his men through Iowa.

FISH COMMISSIONER MCMENOC proposes the organization of a State Game and Fish League, which shall comprise in its membership every one who goes fishing or hunting, all to wear a button and that to be a sufficient introduction should strangers meet. The fees are to be \$1 a year. One of the objects of the society outside of fraternity will be to do away with poaching and killing game out of season. It is thought that were the league properly organized it would have a membership of 100,000.

THE wool production of the United States increased from 1860 to 1870 168.81 per cent; from 1870 to 1880, 43.52 per cent; from 1880 to 1890, 18.71 per cent; from 1890 to 1892, 6.52 per cent. The total increase from 1860 to 1892 was 387.84 per cent. Consumption increased, same time, 414.98 per cent. The London Board of Trade estimates the world's production between 1860 and 1889 increased 100 per cent. Wages of 219,132 employees of American woolen industries amount to nearly \$77,000,000 annually. Their work quadruples the value of about \$99,000,000 worth of wool used.

OR the entire population of the United States in 1890, 60 per cent were single, 35 per cent were married and 5 per cent were widowed. Statistics for the Pacific coast are as follows: California—Total, 700,059; single, 455,250; married, 216,029; widowed, 19,222; divorced, 2586; unknown, 6972. Oregon—Total, 181,840; single, 118,827; married, 56,262; divorced, 752; unknown, 1146. Washington—Total, 217,562; single, 146,851; married, 63,538; widowed, 5145; divorced, 761; unknown, 1267. Nevada—Total, 29,214; single, 19,990; married, 8023; widowed, 771; divorced, 166; unknown, 264. Utah—Total, 110,463; single, 72,266; married, 33,823; widowed, 1802; divorced, 214; unknown, 358. Arizona—Total, 36,571; single, 25,972; married, 9536; widowed, 918; divorced, 104; unknown, 41. New Mexico—Total, 83,055; single, 50,985; married, 29,343; widowed, 2479; divorced, 207; unknown, 41.

Personals.

A. WATERS has returned to Nicolaus from Tuttle town.

SUPR. DAOOETT, of the U. S. Mint, is visiting Humboldt county.

B. B. CHANDLER has gone to Umpqua, Or., to oversee operations there.

LIAM, C. E. GILLETTE, C. E., of the Debris Commission, has returned from a visit to El Dorado and Tuolumne counties.

D. A. McDONALD, "Alex Quartz," who was married last week, has gone to Ashland, Or., to superintend some mining property there.

F. M. SPEER, the inventor, has been mysteriously missing for nearly a month, and his friends are unable to account for his disappearance.

J. S. PILLSBURY, the "flour king," was in San Francisco this week. He attributes the low price of wheat to "overproduction and gambling at Chicago."

F. J. CAEREL, a well-known mining man, representative of the Selby Smelting Company of this city, died of heart disease at his room at the Spokane Club last Tuesday night.

GENERAL J. R. WILLIAMSON, a pioneer of Austin, Nevada, committed suicide last Saturday. He had been brooding over hard times, and, it is supposed, committed the deed while laboring under temporary insanity.

MAJOR W. H. HEUER, Government inspector of rivers and mining dams, was here last Friday, says the *Anderson News*. He went to Igo and Ono to look at the restraining dams of the Engles, Gardner and Tom White mines, and reports them all right. Mr. Heuer also went out to the free bridge across the Sacramento and took a look at that. He said that if the Government ordered work commenced on the river above Red Bluff, the first thing that would have to be done would be for the county to put a draw in the bridge.

Water Power and Electric Transmission.

One of the most interesting examples of electric power transmission the country affords is that of the Redlands Electric Light and Power Co., a plan of which is herewith shown. The station of this company is located some seven miles from Redlands on Mill creek, a stream which flows from the Sierra Madre range. A small dam across the main branch of the stream deflects the water into a tunnel 168 feet long, cut through the solid rock, where it flows into a sand box at the head of the pipe line, 75 feet long by 25 feet wide. The pipe line is 7250 feet in length and the total fall 368 feet, involving a loss of head by friction of 28 feet, leaving an effective head of 340 feet. At its lowest stage the stream furnishes water sufficient for 800 h. p., with several times that amount at a maximum.

The wheel plant consists of two pair of double nozzle 30-inch Pelton wheels, each pair having a capacity of 400 h. p., connected direct to the shafts of two 250 K. W. generators, also a 21-inch wheel driving a 50-light 2000 c.p. arc machine and two 11-inch wheels running the exciters. All of the electric machines, as will be observed, are driven by direct connection to the generators and exciter shafts, the wheels being made of a size to give

"After some seven months continuous service, I am able to state that the water-power plant of the Pelton Water Wheel Co. has given us unbounded satisfaction and our installation as a whole is a model one in every respect. Since opening the gates and turning on the water, the wheels have required no repairs nor any other attention than oiling the journal bearings. The differential governors control the wheels perfectly and maintain a uniform speed on the generators under all variations of load, even the extreme changes caused by starting and stopping the 200-horse power synchronous motor at the ice-house 4½ miles away. This is the best device for water-wheel regulation that we know anything of, and, as will be seen, meets the most exacting requirements of electrical service."

This station has not only been a most pronounced success from an engineering, but from a financial standpoint as well, all the power developed being in demand at remunerative rates, so that an increase of the plant is now under consideration.

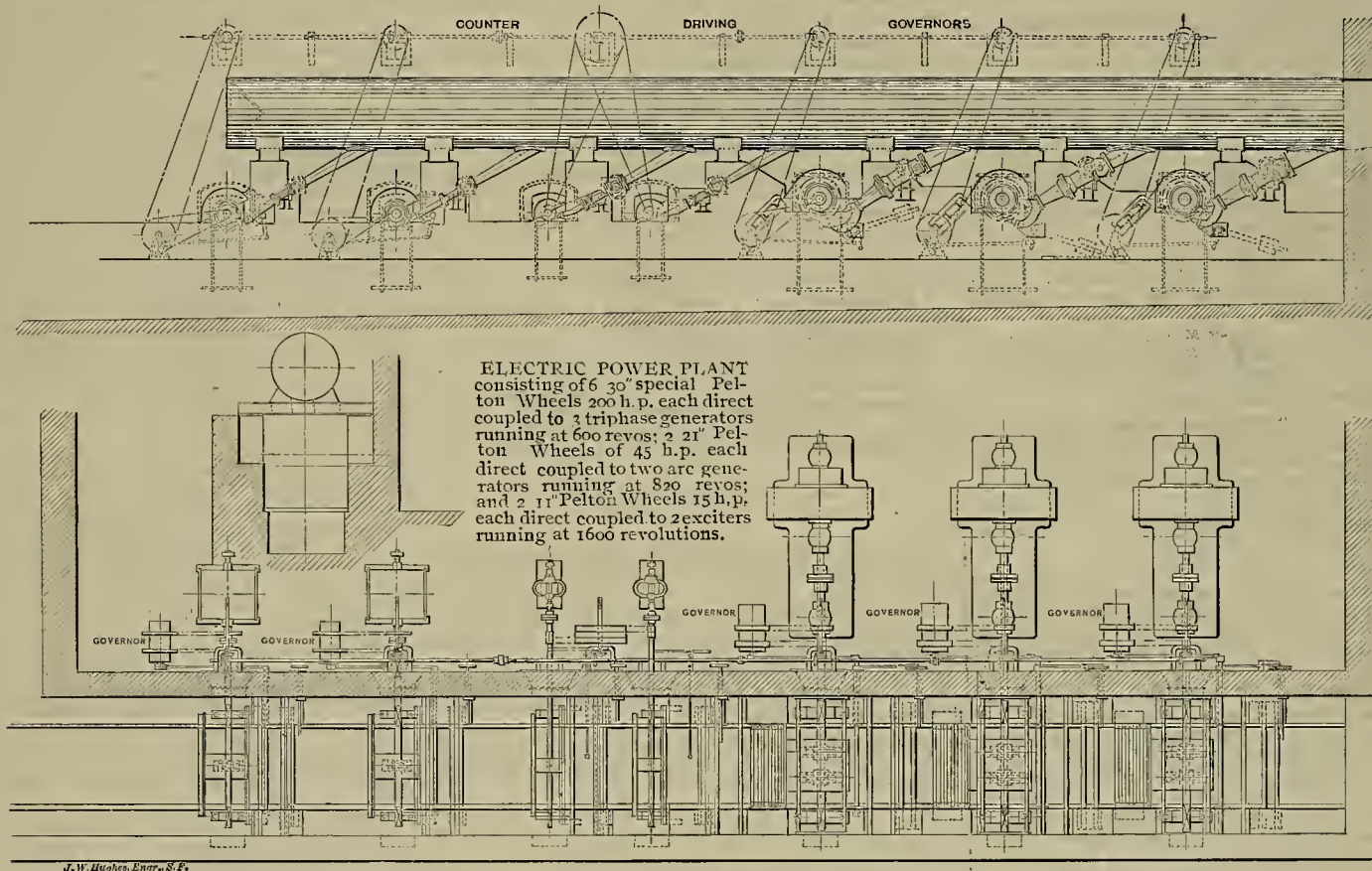
Chlorination of Gold Ores.

TO THE EDITOR:—The term "chlorination" was coined by the writer and first used in his advertisements in San

gange of the mother lode of California, encased in black graphitic slate, the harrel chlorination requires excessive quantities of sulphuric acid to satisfy the alumina present, before any chlorine gas is available for the gold—a difficulty not experienced with vat chlorination.

The latest chlorination process before us, an Australian invention—Sutton's—also a harrel process, in which chlorine is generated in a revolving generator on the same shaft with the impregnation barrel from salt, hinoxide of manganese and oil of vitriol, is the most revolutionary innovation in chlorination. Mr. Sutton astonishes the old operators by his magic collection of the gold from its centrifuged solution by means of churning with kerosene oil and iron protosulphate and centrifuging the precipitate. His method is free from the drawbacks and objections to acidulation of ore pulp mentioned, and has furthermore the advantage of using chlorine as a gas instead of chlorine water, the former being, as Plattner discovered, a stronger solvent of the gold.

Vat chlorination, as introduced by the writer, still holds its own in California, being the most simple and efficient method on ores adapted to chlorine treatment, free from the expense and trouble of machinery; allowing whatever time is needed for the thorough extraction of the coarser



POWER TRANSMISSION PLANT OF THE REDLANDS ELECTRIC POWER COMPANY.

proper speed under the head available and of capacity required to operate the various machines to which they are attached. By this means, all counter shafts, pulleys and belting are avoided, as also the loss of power and cost of maintenance that their use would involve.

The wheels are located in another compartment separated by a heavy wall, the shafts projecting through this into the generator room, and are supported by wall boxes set in solid masonry. By means of water tight glands and insulated couplings, the electric machinery is thoroughly protected from any dampness that might interfere with perfect insulation.

Provision has been made for the subsequent installation of another generator and arc machine to be driven by separate wheels in the same manner as the others. Pelton differential governors are attached to the wheels, by which means absolute control is obtained under wide and instant variation of load. Two circuits are run from the power house—one to the company's office at Redlands, a distance of seven miles, and from thence distributed over the city for lighting and power purposes; the other circuit extending 4½ miles, operating the plant of the Union Ice Co. These works require 200-horse power, and have been run continuously 24 hours per day for the last six months without interruption or a hitch of any kind.

The hydraulic part of this plant was installed by the Pelton Water Wheel Co. and the electrical machinery by the General Electric Co., it being what is known as the triphase system. The president of the Redlands Electric Light and Power Co.—Mr. H. H. Sinclair—furnishes the following statement as to the operation of this plant:

Francisco papers, when introducing the Plattner chlorine process in California in 1860 in connection with his patented combination apparatus now known as vat chlorination.

In late years many new chlorination processes—the Mears, Newberry-Vautin, Pollock, Rothwell, Thies and Sutton processes, have been presented to the mining public.

They are all substantially modifications of Plattner's chlorine process, based on the principle of extracting the gold from its ore by means of chlorine. As far back as 1870 acidulated bleaching powder to generate chlorine for the Plattner process had been used at Reichenstein, Silesia. See Wagner's Chemical Technology, 1870, page 110.

The Mears, Newberry-Vautin and Pollock processes use chlorine under pressure in revolving harrels, but on Mr. Rothwell's and Thies' authority no better extraction of the gold is obtained with high than atmospheric pressure of chlorine gas.

All the later chlorination processes have adopted the revolving-harrel system, while the old California chlorination process still adheres to the treatment in stationary vats.

The harrel chlorination aims to work large quantities of gold ores daily by a short exposure—of say three hours—to the action of chlorine, but is in consequence limited to the treatment of ores carrying the gold in very fine subdivision.

Gold ores containing hydrated oxide of iron, when treated by the harrel process, have to be subjected to a preliminary roasting, not required for vat chlorination.

Furthermore, on roasted pyrites, concentrated from the

gold, a matter of no small importance in these days of fierce competition.

G. F. DEETKEN.

Auburn, May 1, 1894.

Few Mining Failures.

One thing particularly noticeable in Dun's review of the country's commercial failures, last year, is the small number of mining failures reported. Many silver mines have been temporarily abandoned, but very few of them were sold out by the sheriff or placed in the hands of receivers. In Dun's classification mining failures are put in the manufacturers' class. Idaho had but eight such failures last year, and, if all the concerns had been silver mines, the record would hardly be considered a bad one for the mining industry, except in comparison with the showing made by some of the other silver-producing States and Territories. From Wyoming but one mining failure was reported, from Arizona only one, and from Montana, Nevada and New Mexico none at all. In these six States and Territories there were, according to Dun's report, not more than ten mining firms and companies that collapsed from any cause whatever during the year 1893.

THE Stockton Mail claims that "the price of wool has not gone down, but the price of gold has gone up." This is on a par with the declaration that some time ago appeared on the front door of a defunct Texas bank: "This bank isn't broke; the people are broke. It owes \$75,000; the people owe it \$100,000; when they pay, it will pay." In both cases, whatever the line of reasoning, the facts remain the same.

The Amy-Silversmith Case.

The recent decision of the United States Supreme Court in the Amy and Silversmith Non-Consolidated mining controversy, says the Butte *Inter-Mountain*, has caused more comment among mining men and lawyers than anything that has come from that high tribunal in recent years. The legal profession is nearly unanimous in its belief that the Supreme Court erred and has caused great confusion. A great many letters have been received from Denver appealing to the Montana bar to secure a rehearing of the case. The decision, it is claimed, upsets all practice that has heretofore prevailed. Hon. W. W. Dixon, who is now in Washington, has prepared a very interesting and pungent brief on application for rehearing, that will be read with interest in miolog and legal circles. The salient points of Mr. Dixon's application are here given:

The court says in its opinion that it cannot become a locator for the claimant or relocate his claim and make new side lines or end lines, and yet, with due deference, we submit if that is not just what the court has done in this case. The claimant of the Amy made side and end lines for his location, and the court has converted his side lines into end lines and his end lines into side lines.

Third—By the statute the locator has the right to all veins the top or apex of which is within the surface lines of his location, and it is nowhere provided that to give extralateral rights as to any of these veins the location must be laid in the direction of the course of each or all of such veins or so that all such veins shall depart from the location through the surface end lines. We take it for granted that the court understands in this case that defendant never claimed any right to follow any vein across the Amy surface side line upon its course or strike, but only to follow beyond such side line on its dip a vein of which the Amy had the apex within its boundaries and to the extent only that it had such apex. When the latter right is denied us we are deprived, as we contend, of a privilege the statute expressly gives us by reason of our ownership of the apex of the vein.

Fourth—If, as is said in the opinion, the end lines of the Amy location become its side lines as to the vein in controversy, it would appear as though defendant would have a right to follow this vein on its dip to any distance beyond the surface end lines of the Amy. The result of this would be that in every case where the vein ran as in the case at bar the locator might have 750 feet on each side of the center of the vein or 1500 on one side, although the statute expressly limits him to 300 feet on each side. So he might have a right to go on the dip beyond his surface end lines, although he had himself established them as boundaries, beyond which in no case could he trespass upon an adjoining owner. The practical application of the principle established by this decision will give rise to many contradictions and curious complications which can readily be called to mind, but cannot well be dwelt upon here. We would suggest the question in connection with this point as to where the two end lines of the location would be held to be in case the vein in question passed on its course out of one surface end line and one surface side line, or in this case if the vein passed out the east end line of the Amy instead of the south side line. Under the decision, the north side line of the Amy becomes one end line, but does the east end line continue to be the other end line? If so, we have two end lines at right angles to each other; otherwise we have only one end line, whereas the law certainly requires at least two, and says they must be parallel. The opinion of the court would seem to be that any divergence of the location from the course of the vein, so that the vein departs through one or both side lines, no matter how slight such divergence may be, destroys all extralateral rights on the vein; therefore, if the vein departed across the side line by even so much as a foot at the corner of the location, valuable rights would be lost, whereas, if the locator had happened to fix his end line ten (10) feet short of where he did, the vein would have gone through the end line and all his rights would have been preserved. These matters are suggested, not in any captious or hypocritical spirit, but to call the attention of the court to the nicety of the question involved in this decision and to the importance of placing the rules that are to govern this class of cases upon as sound a basis as possible. It is readily admitted that no theory is free from some difficulties, but it is important to adopt one conforming as nearly as possible to the spirit and intent of the statute.

Fifth—We fear the court underestimates the difficulty, the time and the expense required to determine the actual course of a vein, either before or after location, for a distance of 1500 feet, or even less. It is, in most cases, the work of years. For many hundred feet the strike may be regular, and then it may suddenly turn almost or quite at right angles. If a mine owner has no extralateral rights,

unless his location is laid exactly along the vein, he cannot be safe in following his vein to any great depth or on its dip into an adjoining claim until he has exposed the whole length of the vein and found that it runs through both end lines of his location. If he finds it does not, his work will usually be in vain, for he loses the most valuable right he has. At great expense, perhaps, he has demonstrated the value of an adjoining claim which has the dip of the vein and whose owner has incurred no risk and done no work, and very likely has not the apex of any vein within his boundaries and never would himself have found the vein upon his dip beneath his own surface.

The importance of the question involved in this case in all mining communities cannot well be overestimated. This is not, of course, any reason for departing from the legal construction of the statute, but it is a reason for careful and thorough investigation and consideration of the subject.

It seems to us that, practically applied, the rule laid down in the decision in this case will result in doing away with all extralateral rights on veins, although such rights are expressly given by the statute and are among the most valuable pertaining to lode claims. Locations will be practically confined on all sides by vertical planes.

We have mentioned here only some of the grounds upon which we think we are entitled to a rehearing, but others will readily suggest themselves.

It may be remarked that the question here relates to a peculiar branch of the law, with which some of the members of the court are necessarily not very familiar, and that an oral argument, which has not been had heretofore, on the part of the defendant, might possibly be of some assistance to the court. We have been induced to ask this rehearing, not only for the interest of the defendant in the case at bar, but by the request of many mine owners and their representatives, who think their rights are injuriously affected by the decision of the court, and who hope that an opportunity may be afforded for the most possible, careful consideration of the question involved before it is finally decided by this high tribunal, from which there is no appeal.

Relation of Engineering to Civilization.

It is unfortunate for the engineer, says Prof. Hutton in the "School of Mines Quarterly," that his work, fundamental to so much which makes the comfort and civilization of the day, should be concealed and disregarded simply because it underlies. Without the engineer, life in cities would be impossible, where there was no gas, no water supply, no sewage, no food supply except by wagons, no motive power but human muscles. There would be a patrician class served by a class of slaves, and that great, powerful, conscientious, reliable middle class, which makes a nation great and prosperous, would be unknown. Even in the Columbian Exposition, which has been considered the flower and example of what this century has done in the way of artistic culture and industrial progress, beneath the architectural beauty and genius of conception there lies concealed and embedded many weary months of a burning of midnight oil, and of the expert skill of the engineering toiler, in the preparation of the ground and the erection of the structures. Those who delighted in the luminous fountains by night and the marvelous effect of illuminations and the ghost-like flitting of the launches on the lagoons gave, probably, hardly a thought to the pulsing, pumping engine and to the whirling dynamo, over whose production the engineer had presided, and over whose regular march a faithful, conscientious but unseen toiler was watching with a ceaseless attention, and he also as an engineer. These things make a nation great and prosperous, a fertile land, a reverent, painstaking, capable body of professional engineers.

Separating Fine Gold.

What is claimed to be the most advantageous process for the separation of fine gold in placers comes from Montana. It is a dry process, says the *Sun*, designed especially for localities distant from sufficient water for other methods, the ore or gravel being run through a crusher or steam drier, after which it is dumped into the hopper of the separator. Dropping from this, it strikes a powerful blast of air, which carries it between two sets of slowly revolving copper cylinders coated with one-sixteenth of an inch of mercury.

These cylinders are placed in two lines of three each, one above the other, so that the dust, driven by the air blast, passes between them in a wave-like line. The ore first strikes a cylinder similar to the others, but revolves in an opposite direction, which catches the coarser gold and the nuggets. Then, passing between the other cylinders, all the gold is caught, however fine, and the waste is carried by the air blast to a conveyor, which bears it away. The mercury on the cylinders is constantly renewed, so that a fresh surface is always presented; and it is asserted that

the process has been subjected to such various tests, and so successfully, as to demonstrate its peculiar adaptability to the class of work in question.

Electricity's Practical Uses.

The use of electricity for household purposes has hardly got beyond the experimental stage, save in the department of lighting; but enough has been done to show what a transformation may be worked by its aid when it will be possible to have houses heated by it. Then the mere turning on of the switch will suffice; and the current, passing through a suitable heater, which may be as ornamental as means and taste permit, or, if desired, entirely concealed, will do the rest, superseding fires, with all their attendant trouble, smoke and dust. With regard to cooking, there are numerous appliances already devised, and only waiting for the cheapening of the current to be widely taken advantage of. Each cooking utensil, being constructed with the heating coil as part of it, is its own stove; and the whole array of pots and pans need only to have the connection made, and the cooking can go under the most perfect control. Some of the possible arrangements even appear to put a premium on laziness, for, with the food put in the cooking utensils at night, and the necessary connections made, the turning of a switch in the morning in the bedroom starts the cooking of the breakfast. The heating powers of the electric current are also turned to account for raising to the desired temperature hand-stamps, branding irons and the like; while in large laundries electrically heated irons have been found very economical, as they maintain for hours at a time the exact amount of heat suitable for the work, thus saving the ironers much time and trouble.

Medical science has called electricity to its assistance in many ways. Various surgical instruments are heated by it, and the use of very small incandescent lamps, which give out practically no heat, permits more extended examination of the internal parts than is possible in any other way. The use of the microphone has revealed sounds in the heart, lungs and other organs which have hitherto escaped the most sensitive ear using the ordinary instruments. In Russia a lady was saved from premature burial by means of a microphone placed over her heart, which enabled a medical man to detect a faint beat which had escaped the ordinary tests. Another recent development is the use of electricity as a local anæsthetic. Painless operations have been conducted under its influence, and similar applications with suitable apparatus have induced cessation of pain in acute *tic douloureux*. Remarkable cures have also been obtained in such painful maladies as lumbago and rheumatism by simply pressing a small, specially shaped incandescent lamp on the skin over the seat of the pain. It has been found that sufferers from "shaking paralysis" are much better after a rough railway journey; and the late Dr. Charcot, of the Salpêtrière, Paris, the famous specialist in nervous diseases, applied this principle in the construction of a bed, to which a rapid vibratory movement is given by means of electricity, and this shaking, which to a person in good health would be intolerable, proves quite enjoyable to the paralytic subject, who appears to be refreshed by it. Another French physician has devised a vibrating helmet for the cure of nervous headache. An American inventor has brought out a rocking chair actuated by electricity, and the sitter can at the same time receive gentle currents by grasping metal handles or by resting the bare feet on metal pedals.

A patent has been taken out for a mechanical pick-pocket and coat-thief detector—an electrical apparatus which automatically rings an alarm bell when the bearer's personal property is tampered with. Another inventive genius so combined electricity and photography as to secure a flash-light photograph of thieves at work in his office. When they opened a glass case they completed an electric circuit which exposed the camera and simultaneously kindled the flash light, to the great alarm of the depredators. Electricity has further been used in the industrial process of engraving, bleaching, dyeing, the reduction of ores and the purification of metals. Mainly by its aid aluminum can now be produced at a price which is no longer prohibitive. An electric ventilator has been designed for supplying buildings with fresh air, cold or warm, as may be desired. An electric motor sets the ventilator revolving, and the revolution sucks cool air in. When warm air is desired a current of electricity is sent into a network of fine wire, through which the air must pass, heating the wires, and these impart their heat to the air. What should prove a most useful industrial development is the application of electricity to the cleansing and preservation of boilers. The method employed is the sending of currents periodically through the shell of the boiler. By this means the scale formed on the shell and tubes is disintegrated and easily removed.

ONE of the deepest holes, made artificially, in the world, is the one sunk at Parvchowitz, in western Siberia. It has a depth of 6568 feet, and a diameter of 2.75 inches. Work has been stopped temporarily, in order to lower sensitive thermometers into the well; but eventually it is proposed to go down 8000 feet.

The Cornish Tin Streams.

The Cornish tin streamer is by no means a seeker after the ore which is known to mineralogists as "stream tin." He is an altogether modern invention, and depends upon the charity of the big mines, as one may say, for his subsistence, for the ore produced in these mines contains for the most part only a very small proportion of stannic oxide. It is first of all broken by the stone-crusher—a ghastly instrument which reminds you of a giant eating hard biscuit very greedily. Then it is taken to the "floors"—great sheds, open at the sides, and with cobbled floors—and broken yet smaller by girls—"bal maldens," as they call themselves. Next, the stone is fed to the "stamps"—huge iron hammers, which work night and day, and fill the surrounding country with a sound resembling that of a distant and angry sea. Here the stuff is reduced to a powder, and a stream of water washes it out into long trenches in front of the stamps. The lighter portion of the ore is thus partly removed, and though, as will be seen, the process of purification is a complicated one, it consists entirely of various applications of the principle that water, running over a sand made up of various constituents, will gradually eliminate the less weighty components. The concern of the tin streamer lies with this lighter portion which is carried away from the mine.

It is currently asserted that the loss of tin in the Cornish mines is proportionately less than in the dressing of gold ores. Nevertheless, the sand which is carried away with the waste water from the mines is by no means worthless. There is much hematite in tin stuff, and thus everything about the mines is stained a dull red. This is true of the water which has been used to wash the tin. It runs away from the mines, and small individual streams unite in the valleys to form what is known as "the Red river." Many a tourist skirting the Cornish cliffs must now and again have seen the sea incarnadined over a tract extending for many miles. And from their sources below the mines, right down to the very beaches, the tin streamers will be found at work along all the red rivers. First of all, the water is turned aside from its channel and made to run through huge ponds. Sometimes they are 100 yards long, and their banks—built of furze-faggots and slime—are 15 to 20 feet in height. In these the water gradually deposits, in the

form of a red slime, the first portion of its burden. There may be a dozen of the ponds at a single works, and the flow of the water is only stopped when any particular one of them is almost filled with the deposited slime. This is then worked up with water, which carries it on to the "rag frames." Briefly, the rag frame is a slanting wooden table over which the slime-laden water is made to flow. A deposit of slime forms, and the water flows off by a wooden gutter. Presently a lever is lifted with double effect. The first gutter is shut off and another opened, and the frame is suddenly flushed with clean water, whereby the deposit which has formed upon it is carried away through this second gutter in certain ponds, called covers, where it is allowed to settle. Out of these covers the slime is presently conveyed over another set of frames, which are known as "cleaner frames." In the first stage the work is overlooked by little boys. Here, however, it is in the hands of girls and women, who wear big white aprons and sun-honnetts so closed that their faces are hardly to be seen. And some of them are pretty. The slime-laden water still flows over the frames, and the "maldens" carry long-handled and very long-haired brushes, with which they spread the slime abroad and expose the whole deposit to the action of the water. Thus a further separation is effected, and the slime is carried on to yet another set of covers. The girls who are employed at this work are at it all the year through for about ten hours a day, and they are absolutely without shelter; yet most of the girls in mining villages prefer this life to that of the domestic servant. Indeed, if there were frequent frosts, tin streaming would be almost impossible, for

first plays havoc with the frames unless your night-watchers are very much upon the alert indeed. When the water from the cleaner frames has deposited so much slime as suffices to fill one of the covers, it is made to run elsewhere. The slime is then taken away in wheelbarrows to the "buddles." These are of varied forms, and are, in fact, only another method of applying the principle of the frames. The simplest form of huddle is merely a gutter down which the slime-laden water runs, to fall presently into a circular pit. An exit is provided for the water at the side of the pit; the sand or slime remains behind in a circular deposit, the heavier particles being at the center, the lighter at the circumference. When the pit is almost full the water is stopped. A man skilled in such judgments takes a shovel and marks three rings upon the pile; the outer layer is thrown away, and the other two are fed by means of water to the other buddles. But this rudimentary form is only used in one particular instance. Commoner is a slender-spoke wheel revolving in a plane parallel to the bottom of the circular pit. Some of the spokes are wooden gutters; others are merely poles, from each of which a long brush, fitted with very soft hairs, is suspended by a couple of strings. At the axle of the wheel is a circular cup out of which the gutters open. The slime is placed in a wooden trough, where water trickles over

and buddles. The streamers, therefore, have learnt of late years to raise the level of the river bed by means of a board stretched across it. The sand is thus arrested, and the water to some extent removes the lighter particles. Presently the water is turned off into another course, and the sand is thrown out upon the banks. As it is wanted it is conveyed to the pulverizers. These are great revolving cylinders, which contain a large amount of loose scrap iron. The sand is passed into them by a current of water, and they are so devised that it can only find its way out when it has been finely powdered. And it is the sand which issues from these pulverizers which is treated in the first place by the rudimentary huddle described above. Afterwards that part which is not rejected goes through pretty much the same process as the stuff which gets deposited in the slime pits. These tin streams return a very large quantity of tin every year. It would seem that any number of them may subsist upon the same stretch of the Red river. And even when the water gains the sea it is by no means wholly deprived of its tin.

Mt. Shasta.

The approach of the outing season gives keen zest to striking portrayals of the gems of natural scenery. In

this list may surely be placed the engraving upon this page, page, notable as a new view of one of our grandest mountains—quite different from the earlier portraits of this grand uplift of earth-crust which have already appeared in our columns.

Mt. Shasta has been appropriately termed the keystone of the arch formed by the great incurving mountain chains of California, the Coast Range and Sierra Nevada. Though the great floor of the Sacramento valley terminates about on the southern boundary of Shasta county, in a foothill region half-circular in shape, there is beyond this the upper valley and its many arms with their inclosing hills and mountains, forming a country rich and picturesque, which extends northward many miles before the higher mountains close in and place the crown of eternal snow aloft on Shasta's brow, 14,440 feet above the level of the sea.

It has been frequently remarked of late that the great snow-covered mountain, through the dissemination of engravings of it reproduced from the masterpieces of the

artists, has really given distant people the impression that northern California was an arctic region and central California must therefore be semi-arctic. Such conclusions are very erroneous. The towering Alps do not lead to a misconception of sunny Italy, nor should Shasta reflect a chill, even in thought, upon the genial regions which owe their winterless climate in part to the protection afforded by his massive form and by the ranges which inarch their ridges on either side to support his pedestal. A recent writer has commented upon the majesty and beneficence of Mt. Shasta as follows:

"Of all American mountains it has the most sovereign look. It leans on no other height; it associates with no other mountain; it builds its own pedestal in the valley, and never drops its icy crown. It is a glory in itself. It seizes the clouds with icy arms and compresses them until their contents are dropped upon the thirsty fields below; from its base the Sacramento starts on its way to the ocean; despite its frowns, it is a merciful agent to mankind, and in the minds of those who see it in all its power and splendor, a picture is painted which will last as long as the gift to admire anything magnificent is left."

Of late years Mt. Shasta has been brought very near to his admirers by the overland railway which passes near him. Accessibility has also made the Shasta region popular as an outing resort. Formerly only the persistent and venturesome penetrated thither, but now the building of a great hotel and the abundance of more modest accommodations brings a hundred to Shasta where one went before.

GUNPOWDER was first employed in blasting in the Hartz mountains about 1120, and was denounced as sorcery.



MOUNT SHASTA—FROM A RECENT PHOTOGRAPH.

Scientific Progress.

Edison's Kinetograph.

The latest wonder of photography is the kinetograph, the marvelous device with which Mr. Edison has accomplished the feat of recording and reproducing motion. It has long been the distinction of the pictorial or plastic arts that they represent form only, but, as the present generation may say of a great many things, we have changed all that. Mr. Edison accomplishes this wonderful result by taking an unbroken series of photographs at the rate of 46 a second, giving pictures of the most agile acrobatic feats so closely following each other that hardly any difference can be detected between any one and the next. When the pictures are made to pass before the eye at the same rate of speed they blend into each other so perfectly that the motions of the person photographed can be seen with great distinctness. Many revelations were at once made by the application of this instrument, which almost equals in importance the discoveries from instantaneous photography, as for instance the fact that in turning a somersault on the hands there is a place where both hands and feet are off the ground at once, although the acrobats had been quite unconscious of the fact.

The chief importance of the invention, however, is in connection with the kinetoscope, as Mr. Edison calls his reproducing apparatus. Its practical uses seem almost unlimited. With the co-operation of the phonograph the words and gestures of a great actor can be handed down to a glorious immortality. Generations yet unborn may hear and see the tragic power of Bernhardt and Duse, of the kaleidoscopic gyrations of the ballet queens of our day. Every one may transform his house into a parlor theater where one may see through a peephole and hear through a funnel the plays of Shakespeare and the operas of Wagner by the simple pressing of a button. Nay, more, if the predictions of such scientists as Professor Houston come true, it will not be long before we have a real telescope which is something more than a spyglass, and will enable us to see as far as we can telephone. Rapid progress has been made in this direction since the discovery of the singular qualities of selenium, which alters its conductivity with varying conditions of light and shade, and Edison, Morse, Le Poutois, Johnson and Amstutz have met with such remarkable results in transmitting light through a wire that many conservative scientists concede the possibility of the electrical transmission of pictures. When that is accomplished we shall be able to talk with our friends a thousand miles away, and at the same time watch the play of their features. Admirers of football in all parts of the country may enjoy the game as it proceeds, kinetoscopic images of each play being flashed on a stereopticon screen. All this sounds incredible enough, but no more so than did the steam engine or the telephone to the people who first heard of them.

Photographing the Clouds.

The poetry of the skies seems to have been caught in the latest specimens of H. Angot's new method of photographing clouds. The blue of the sky, as a rule, sets strongly on the sensitive plate as the white of clouds, and hence a resort to artifice is necessary to obtain clear pictures. When the sun is hidden by the clouds, they come out very well in the photograph; but for the best results a dilute pyrodeveloper and a few drops of bromide of potassium solution should be employed, and the development should be effected slowly. This method, however, does not answer in the case of cirrus clouds, which are composed of snow crystals, and are the most interesting in a picture. Such clouds come out well in

photographs taken on the top of a high mountain, and Prof. Riggenbach has even succeeded in taking them from low levels by warding off most of the blue light of the sky, which is polarized, with a Nicol prism, or black glass inclined at an angle of 55 degrees in front of the lens of the camera.

Angot's method, however, is greatly superior to this, and consists in placing a screen of colored glass transmitting only the yellow and green, and stopping the blue and violet rays, in front of the camera. Orthochromatic or Isochromatic plates must be used, as they are very sensitive to the yellow and green rays from clouds. The best screen is formed of two parallel panes of glass five or seven millimeters apart, and having the space between filled with an almost saturated solution of bichromate of potash to which a few drops of hydrochloric or sulphuric acid have been added.

A BRIDGE RAIL, in the hollow of which telegraph wires, and even a small water pipe, can be laid, has been designed by Herr G. Lichtenfelder. It is calculated that the invention will be of special use in mines, as signaling conductors may thus be brought up to the face of a heading concurrently with the rails, and also the small pipe for leading water with which to keep cool the points of rock drills and clear out the debris from the holes, while such wires and pipes are, at the same time, effectually protected from injury in the event of portions of the roof falling, etc.

ONE objection to transmitting power in the form of steam for a long distance is that a pipe is apt to radiate heat so rapidly that the energy is quickly lost. Eckley B. Cox recently told the American Society of Mechanical Engineers, though, of a case where steam was delivered 4500 feet away from the boiler plant and used effectively. The pipe was conveyed in a trough made by nailing two boards together at right angles, and covered by a similar one, the intervening space being filled in with asbestos.

THE plot chart of the North Atlantic ocean, issued by the United States Hydrographic Office, has long been a valuable resource of the mariner for information about winds and currents, icebergs, floating wrecks, probable weather and other important matters. A similar one has now been issued for the North Pacific. This highly commendable experiment needs Congressional aid in order to be continued, but the growing importance of Pacific commerce fully justifies this enterprise.

ONE serious difficulty in the way of using excessively high steam pressures is that the attendant heat renders lubrication uncertain and unsatisfactory. To substitute graphite for oil in such cases would afford relief. Hence the value of a device lately invented for automatically feeding graphite to a steam engine cylinder. The material is first pulverized and then discharged in a dry powder at a rate easily regulated from a cup on the cylinder.

By the alloy of iron and nickel a new metal has been produced that will sustain a pressure of 15,000 atmospheres. It has been named Krupp metal, and is intended, says *L'Echo des Mines*, to be used for ordnance firing heavy charges of dynamite.

A CANTILEVER BRIDGE will be built at New Orleans for the Southern Pacific road, with one central span of 1070 feet, and two 608-foot anchor spans. The channel span will be the longest bridge truss in the world except that over the Frith of Forth.

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Table of Contents.

The following brief abstract of the contents will give an idea of the branches of the subject treated:

General Plan; Discussion of the Principles of Hydraulics; Rules Deduced from Formulae Obtained; Examples and Calculations; Extensive Tables for Ready Reference; Fundamental Laws of Hydraulics Demonstrated and Expressed in Formulae and Rules; Flow of Water through Openings; Weir Coefficients; Triangular Weir; Flow of Water Over Quadrant Weir (tabulated); Application of Tables; Submerged Orifices; Flow through Orifices in Thin Partitions; Tables and Applications; Miners' Inches; Tables and Calculations; Flow of Water through Short Tubes and Compound Tubes; Flow of Water through Pipes; Tables of Velocities and Cubic Feet Flows for Given Fall per Mile and Diameter of Pipe; Coefficient for Bend—Circular and Angular; Flow through Nozzles; Inverted Siphons; Flow of Water in Open Channels; Extensive Tables; Rough and Ready Notes; Hints for Speedy and Approximate Estimates, etc.

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Mechanical Progress.

Recent Air-Brake Tests.

Great things are already done by the best air brakes now in use; but that persistent and accomplished inventor, George H. Westinghouse, has long been studying how to secure even better results—such efforts being rendered necessary by the steadily increased speed and weight of our fast American express trains. An average velocity of 50 miles an hour for several hours means, as every one knows, an occasional lessening of speed to 20 or 30 at curves and bridges, besides stops, and hence occasional increases on level, straight track to the rate of 60, 70, 80 or even 90 miles an hour. If necessity arises, how can trains under these latter conditions be quickly and safely stopped? Obviously, mere pressure of the brake will not meet the requirements. Beyond a certain limit the wheels will cease to rotate, and then will slide; and this will not check progress so effectually as a pressure low enough to just fail of stopping rotation. However, it has long been known that more pressure may be used before the wheels will slide if the train be running at very high speed than at a moderate one; and Mr. Westinghouse has sought to utilize that fact by providing for gradually diminishing the pressure. This would enable him to apply the brakes more vigorously for the first few seconds than has been deemed advisable hitherto. For the present practice is such that the brake remains set at a uniform pressure, whatever that may be, until released.

Two trains were run side by side on parallel tracks of the Pennsylvania road a few days ago for testing Mr. Westinghouse's new plan. On one he carried not only increased pressure in the train pipe and larger air cylinders, under the cars, but also a special pressure-releasing valve in connection with the existing "quick-action triple valves." The locomotive was also provided with brakes for the small forward wheels as well as for the drivers. On the other train increased pressure was the main departure from usage. The two engines kept exactly together, and the brakes were set simultaneously by "tripping" devices placed on the track. Owing to bad weather, unworn brake shoes and some other influences, the tests were not as satisfactory as had been hoped. But experts find in the result indications that the new attachments possess great value.

A New Fuel.

The following is the method of manufacturing petroleum bricks for fuel:

Mix one liter of petroleum, 150 grams triturated soap, 10 per cent of resin and 333 grams of caustic soda. Heat this mixture, being careful to stir it well meantime, until solidification commences—say about 40 minutes. If the mixture should tend to boil over, pour in a few more drops of the soda, and continue to stir until solidification has sufficiently progressed; then pour the semi-fluid material into molds to form the bricks, and place these in a hot room or drying place for 10 or 15 minutes; then remove them and let them cool. In a few hours they can be used as fuel.

To the three elements, which constitute the mixture, Mr. Mastracci recommends the addition of 20 per cent of sawdust and 20 per cent of clay or sand, which makes the bricks more solid and less expensive. Trials of these bricks as fuel have been made at Marseilles on several tugs, and it has been found that, weight for weight, they develop three times as much heat as the ordinary coal brick, and leave no ashes.

It is expected, with some slight changes in the furnaces, to arrive at still more perfect results, not only in the increased heat, but in the entire suppression of smoke, and on the most economical basis, one kilogram

of the solidified material being equal to four kilograms of coal. These experiments seem to be very interesting, and it is quite easy to understand that there is a double advantage in using such fuel on steamers, as they economize in both space and cost.

Rolling Thin Plates.

The record for rolling thin sheets of iron has again been broken, this time in Swansea, Wales, and the process is thus described in a local paper: "The iron from which the sheet was rolled was worked in a finery with charcoal and the usual blast, afterward taken to the hammer to be formed into a regular flat bottom, thence conveyed to the balling furnace, and, when sufficiently heated, taken up, the rolls lengthened, and cut by shears into proper lengths, piled up and transferred to the balling furnace again. When heated, it was passed through the rolls, back again into the balling furnace, and, when duly brought to the proper pitch, taken to the rolls and made into a thorough good bar.

"Subsequently, at the tin mills, it was rolled till it was supposed to be thinner than 23 grains, afterward passed through the cold rolls to insure the necessary polish, the result being the thinnest sheet of iron ever rolled—that is, the sheet was $10 \times 5 \frac{1}{2}$ inches in surface, of only 20 grains weight, which, being brought to the standard of $8 \times 5 \frac{1}{2}$ inches, or 44 surface inches, is but 16 grains, or 30 per cent less than previous attempts, at least 4800 being required to make one inch in thickness."

A Long-Sought Material.

The production of a new glass having the valuable property of supporting sudden variations of temperature has been announced by two German chemists, Winkelmann and Schott. Retorts and other laboratory utensils made of this glass could be exposed without any precaution to the flame of a Bunsen burner or even of a blowpipe. This means, to the chemist at least, a great economy, for much heat is lost by the ordinary process of interposing wire gauze between the flame and the utensil, and it is claimed that liquids can be heated in the new glass with less than half the time and gas necessary by the usual method.

Floor-Washing Machine.

A floor-washing machine has been recently invented. The mechanism consists of a main frame, with suitable driving wheels, driving an endless belt provided with a series of flaps, a water tank delivering upon the belt, which is also engaged by wringing rollers, beneath which is supported a dirty water tank. The flaps absorb the water and bring a large rubber surface to bear on the floor as they are carried beneath the roller, the belt and its flaps then passing between the wringing rollers and the machine being used by simply pushing it across the floor, after the clean water pipe has been opened.

Cart Before the Horse.

Putting the cart before the horse is no longer a mere conception. In France it is now an accomplished fact. An inventor has gotten up a street car or omnibus, not drawn, but driven with gearing from a treadmill attached to the gear of the vehicle and supported on wheels. The horse, therefore, rides while he works.

ANNUNCIATORS, indicating the name of the next station, are in use on the Metropolitan and District suburban roads in and near London. They are set, after leaving a station, by pulling a cord. One official controls the apparatus in all the cars of a train simultaneously. This method of imparting information is an improvement on the one now in general use, of bawling out the names more or less indistinctly.

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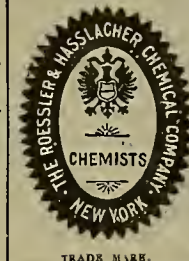
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Electric Progress.

Electricity in Incubation.

Electricity has found a new outlet in Pittsburg in the line of incubation. In one of the prominent business buildings a very crude arrangement has been used to hatch eggs and has given very good results, fully 90 per cent of the fertile eggs resulting in lively, well-developed chicks. The apparatus consists of a small box, in the lower part of which is a drawer lined with cotton, where the eggs are placed. Above them two incandescent lamps of 16-candle power are suspended, and the steady heat radiating from these globules maintains the necessary temperature of 100 to 103 degrees F., which is indicated by a thermometer placed among the eggs. The minor details of moisture and the occasional turning of the eggs were observed as in the ordinary incubation. The chicks are thriving, and a new set of eggs is being treated, about half of which are goose eggs. The scheme is susceptible of considerable development from this crude beginning, as a resistance box instead of the lamps would be more effective and more economical. The commercial aspect of the question remains to be shown.

Switching by an Electric Capstan.

An expert in railway matters declares that the day is not far distant when the switching engine will be entirely done away with, its place being taken by the electric capstan. The latter is already in use to a certain extent on some of the Pennsylvania lines. The motor, which actuates the capstan by means of gearing, runs at the rate of some 1200 revolutions a minute; and the gearing, motor and switch of the capstan are all combined in a water-tight iron case, the top of which comes flush with the ground. There is a cover to it which is readily removable, so as to give easy access to the motor for oiling and cleaning. The wires containing the current for the motor are carried through an iron pipe below the surface of the ground, and the switch for starting and stopping the motor is operated readily by the foot of the attendant in charge of the capstan.

Wind Power and Electricity.

Prof. James Blyth, who has been experimenting in the utilization of wind power for the generation of currents, has devised a new system. To four strong arms, each about 26 feet long, he attached semi-cylindrical boxes, the opening of each box being 10x6 feet. The vertical shaft is a long rod of iron five inches in diameter. At the lower end it carries a massive pit wheel, which actuates a train of gearing, and drives a fly-wheel six feet in diameter. With a fair wind speed it gives four electrical horse power, and it works very satisfactorily in a strong gale.

THE arc lamp is yet to be touched up to more perfectly uniform action; the glow lamp is to be cheapened; alternating current motors are to be perfected; electro-metallurgy is to be fostered and brought more generally into commercial usefulness; condenser railways must be attained; storage batteries or gas batteries of a permanent type are to be designed; long-distance transmission must come; and a host of other kindred tasks remain. We are but on the threshold of the electrical age.—*Electrical Review*.

THE *L'Electricien*, Paris, gives the following pedigree of a word which has attained importance in electrical phraseology: Most persons who use the word "trolley" probably do not know the origin of this term or why this term was given to that apparatus by which the electricity is conveyed from an aerial wire. Twenty years ago the word was used to designate "a form of truck which can be tilted for carrying railroad material or the like." This is the only defini-

tion of the word in Webster's dictionary of the edition of 1848. In the edition of 1892 of the same work three other definitions are added: 1. "A narrow cart that is pushed by hand or drawn by an animal." It is noted that this meaning of the word is in use in England, not in the United States. 2. "A truck from which the load is suspended on some kinds of cranes." This meaning is technical according to Webster, and employed only in speaking of machinery. 3. "(Electric Railway.) A truck which travels along the fixed conductors and forms a means of connection between them and a railway car. It is easy to see how the primitive form of the electric trolley, which travels upon the wires, came to receive its name from its resemblance to other types of trolley; and the name, having been immediately given to this primitive form, was naturally retained when the method of connection was changed from a little truck moving on the wire to a mast having at its end a wheel pressing on the lower surface of the wire.

THE steamer Faraday recently left London with a portion of the new cable of the Commercial Cable Company, which is to be laid from Waterville on Ballingbegs bay, coast of Ireland, to Nova Scotia. The Faraday is not large enough to stow the entire cable, which will be 2000 miles long. The process of laying it will include the dropping of 400 miles of cable this side of the Atlantic, then the placing of another hundred miles on the other side, and finally the picking up of both portions with the main part. The manufacturers guarantee the Commercial Cable Company that this cable will afford 33½ per cent improvement in speed over any cable the company now has in use. This means that 30 words a minute may be sent.

AN interesting point in law was developed in New York city recently. A club rented a house and secured a reduction in the rental in consideration of making some improvements, among which was the introduction of electric fixtures and wiring. The lease of the premises expired, and the club deciding to move, proceeded to take away the electric fixtures. The landlord protested without avail, and finally secured an injunction from Judge Bookstaver restraining the club from removing the fixtures.—*Electrical Review*.

THE first link in the chain of electric railways which will eventually connect New York and Philadelphia is now well under way. The Philadelphia division, between Bristol and Trenton, 34 miles in length, has been surveyed, and that section alone will include a mile of bridgework. The contracts for construction, it is said, will soon be let, and the work will be pushed to an early completion.

AMONG the many experiments lately made for utilizing the rise and fall of the tides as motive power, one is reported to have been tried on the coast of Cheshire, where power for driving a dynamo and lighting a house by electricity has been supplied by a tidal mill of about four-horse power.

THE *Electrical Review* says that Egyptologists have found unmistakable evidence of wire communication between some of the temples of the earlier Egyptian dynasties, but whether these served a telegraphic, telephonic or other purpose is not stated.

ONE of the electric launches that were employed on the lagoons at the Columbian Exposition in Chicago is now running on the Grand Canal in Venice, and is so much liked that it is predicted that the "gay gondolier" will have to go.

ELECTRIC LOCOMOTIVES are proving themselves to be well adapted for use in coal and other mines, and they now furnish motive power for hauling cars in about 30 mines in the United States.

Practical Information.

A Great Jetty.

"The great jetty at the mouth of the Columbia river, in Oregon," says the *Railway Review*, "is the largest and most important one ever constructed, and has the still greater distinction of having been made for 25 per cent less than the estimated cost. The work, we need hardly say, was done by the Government engineers and without contracts. The work is more than four miles long, 15 feet wide on top, and has consumed 6000 piles that were inserted mainly by water jets, a few blows being given at the end of the sinking with a hammer of three tons weight. The estimate for the work was \$3,710,000, and the cost will be one-fourth less. The work is now nearly completed, and has accomplished fully what was intended, giving passage over the great bar for vessels of any draught. The depth of water alongside the work has been increased from 6 to 20 feet in some places, and 4000 acres of area have been raised above the water. The Columbia is 1000 miles long, the only large river on the Pacific Coast, and forms the only safe harbor between Seattle and Puget sound, 600 miles."

Branding Ice.

A novel idea has been patented by Van der Weyde, by whose inventive ingenuity the electric light was first successfully applied to portrait photography, for the purpose of securing pure ice for table use. The invention is based on the fact that two smooth surfaces of freshly cut ice, when brought into contact at a temperature below the freezing point, will unite so firmly that the junction between the parts will be as strong as any other portion of the combined mass. Subjected to a higher temperature, however, the junction is the first to yield to a blow or pressure, and the ice easily breaks into the original pieces. Utilizing this property, Mr. Van der Weyde casts blocks of ice into small cubes, which are stamped with a star or other trademark. These cubes are joined into a larger cube, say of 16 or of 32 pounds weight, and so sent out for use. The trademark is a guarantee that the ice is perfectly pure, and the small cubes weigh only half an ounce—a most convenient size.

Shepherds in Italy.

The first annual report of the United States Commissioner of Labor thus portrays the conditions, wages, etc., of shepherds in Italy:

"Condition—Lives in haystack-like hovel; leads a solitary life; cannot read; possesses but a slight degree of intelligence.

"Diet—Breakfast, black bread, oil, water; dinner, black bread, oil, water; supper, black bread, oil, water. This meager and monotonous diet is varied at frequent intervals by a very small piece of bacon, salt pork or macaroni, an onion or a little funnochio; on great fete days by a little wine.

"Earnings at seven cents a day, \$25.55.

"Cost of Living for the Year—Bread, \$14.60; oil, \$5.47; other food supplies, \$1.82; clothing, \$3.66.

"Expenditures, \$25.55.

"Earnings, \$25.55.

An Old Man's Record.

A methodical man died in Berlin recently at the age of 73 years. When 16 years old he began keeping a record, which he continued for 52 years, which is the best commentary we have seen on the life of a mere worldling. His book shows that in 52 years this "natural man" had smoked 638,715 cigars, of which he had received 43,692 as presents, while for the remaining 585,021 he had paid about \$10,433. In 52 years, according to his book-keeping, he had drank 28,780 glasses of beer and 36,086 glasses of

spirits, for all of which he spent \$5340. The diary closes with these words: "I have tried all things, I have seen many, I have accomplished nothing."

A Lake in the Clouds.

A triumph in engineering is reported from the mountains of Peru, where a twin-screw steamer of 540 tons, 170 feet long and 30 feet wide, has been successfully launched on Lake Titicaca, the highest navigable waters in the world, more than 13,000 feet above the sea.

The steamer, which belongs to the Peruvian Government, and is to be used for freight and passenger traffic, was built on the Clyde, then taken apart in more than a thousand pieces and shipped to Molendo by sea. It was then carried to Puno by railway and transported over the mountains on the backs of llamas and mules, and put together by a Scotch engineer.

Diamonds in the United States.

Diamonds occur in the United States in two regions. One extends along the southern base of the Alleghany mountains from Virginia to Georgia; the other on the western side of the Sierra Nevada and Cascade ranges in northern California and southern Oregon. The mineralogical conditions of these two remote regions are very similar, and the discoveries made in them are much alike. The formations in the diamond-bearing localities of the United States are very much like those of Brazil and India, and very unlike those of South Africa, where the great diamond fields of the world lie.

Where the Money Went.

When the Midway Plaisance people were leaving Chicago, bankers were kept busy for quite a while in changing \$1,000,000 or more, which they carried away as the result of a summer's industry, into the coin of other realms. A donkey boy from Cairo street unrolled a tattered cloth containing \$700 in silver, for which he wished French francs, while a camel driver had a clear \$1000. An Arab, a Turk, a Nubian soldier and a Persian dancer each had a little fortune of \$1000 in silver.

A PROCESS devised for renovating old belting is claimed to strengthen the fiber of the leather to a remarkable degree. The belting is passed through a tank containing a solution of beeswax, borax, glue, starch and molasses in equal quantities, and the compound is then squeezed into the fiber by press rollers. The leather is immediately dried by being passed between two steam-heated copper cylinders, and the renovation is complete.

A CURIOUS FEATURE about Japanese journalism is that every important paper is said to have a "prison editor." Japanese journalists are so constantly being fined and sent to prison that the sole occupation of the individual is to go to jail when called upon.

MAKING many copies of documents inflicts upon the typewriter operator a peculiar sort of nervous exhaustion. In well-conducted offices these copies are now given in rotation, alternating with other work.

THE function of the negro's black skin is now supposed to be the conversion of the sun's light into heat. The heat thus generated remains in the skin, never penetrating to the deeper and more vital tissues.

AUTOMATIC watches, which show the time by changes in figures each minute instead of by the ordinary hands and Roman numerals, are becoming quite fashionable.

THERE are many horses that have never been seen to lie down in their lives. Their rest is not complete, however, and the joints and sinews are liable to stiffen early.

Diamond Mining.

The De Beers and the Kimberley mines are probably the two biggest holes which greedy man has ever dug into the earth, the area of the former at the surface being 13 acres, with a depth of 450 feet, the area and depth of the latter being even greater. These mines are no longer worked from the surface, but from shafts sunk at some distance from the original holes, and penetrating to the blue ground by transverse drivings at depths varying from 500 to 1200 feet. The blue ground when extracted is carried in small iron trucks to the "floors."

These are made by removing the buns and grass from a fairly level piece of ground; the land is then rolled and made as hard and as smooth as possible. These "floors" are about 600 acres in extent. They are covered to the depth of about a foot with the blue ground, which for a time remains on them without much manipulation.

The heat of the sun and moisture soon have a wonderful effect upon it. Large pieces which were as hard as ordinary sandstone when taken from the mine soon commence to crumble. At this stage of the work the winning of the diamonds assumes more the nature of farming than of mining. The ground is continually barrowed to assist pulverization by exposing the larger pieces to the action of the sun and rain.

The blue ground from Kimberley mine becomes quite well pulverized in three months, while that from De Beers requires double that time. The longer the ground remains exposed the better it is for washing. The process of exposure being completed, the blue ground is then carried to very large, elaborate and costly washing machines, in which, by means of the action of running water, the diamonds are separated from the ordinary earth.

It may be mentioned that in this process too loads of blue ground are concentrated into one load of diamondiferous stuff. Another machine, the "pulser," then separates this latter stuff, which appears to be a mass of blue and dark pebbles of all shapes, into four different sizes, which then pass on to the sorters.

The assorting is done on tables, first while wet by white men, and then dry by natives. The sorters work with a kind of trowel, and their accuracy in detecting and separating the diamond from the eight different kinds of mineral formations which reach them is almost unerring.

Literary Note.

Notable articles in the May *Overland* are: "Egypt To-day," by Hon. Jeremiah Lynch, author of "Egyptian Sketches"; "The Palmistry of China and Japan," by Professor Stewart Cullen, of the University of Pennsylvania, the first article on that subject in the English language; "The Collie in Mendocino," a beautifully illustrated paper; "The Nicaragua Canal," by Lieutenant Winn, U. S. A. (military advantages), and Captain W. L. Merry, Consul-General of Nicaragua (political aspect); "King Solomon's Mines," by Rounsevelle Wildman, the editor, a Malayan sketch; "The Chinese Six Companies," by an educated Chinaman, intended to correct much popular misunderstanding; and "More Rambles on the Midway," a continuation of the elaborately illustrated Midwinter Fair articles.

If advanced electricians are not altogether too sanguine, we may soon be able to carry on telegraphic communication without wires. Mr. Preece, the eminent English electrician, in a recent paper, gave it as his opinion that it would be quite easy to speak between France and England across the straits of Dover without any metallic connection.

PETROLEUM has been successfully used to prevent the incrustation of boilers and remove the scales already formed.

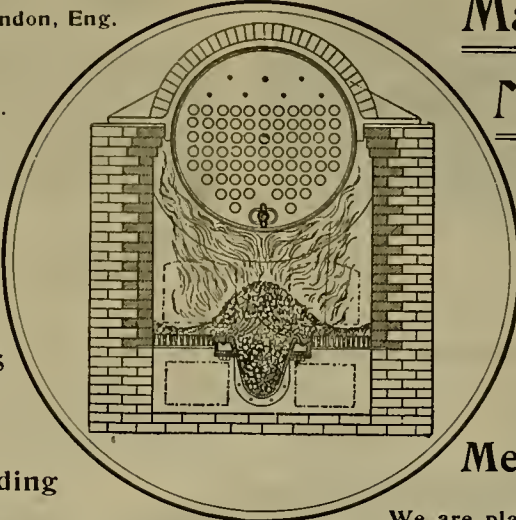
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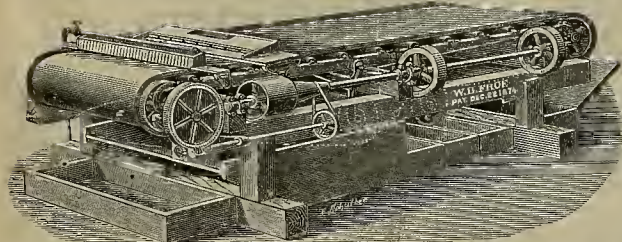
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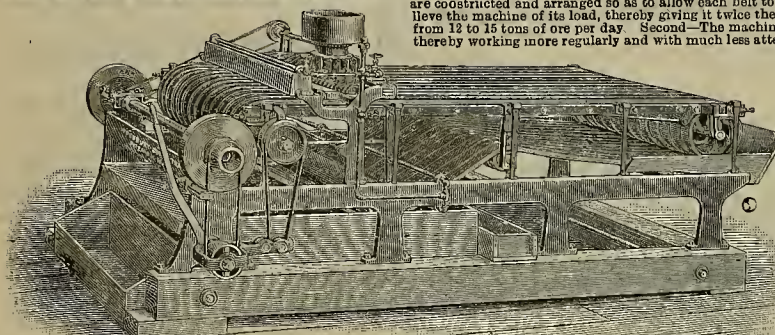


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 C. J. CLARK, Gen'l Supt.

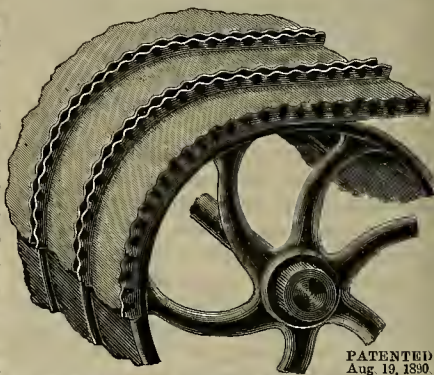
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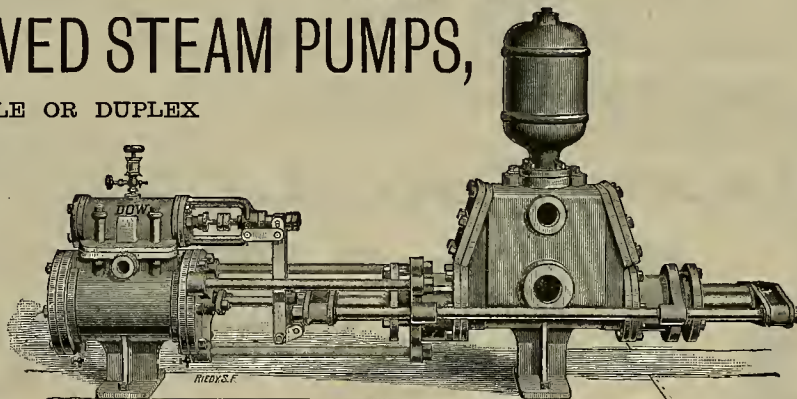
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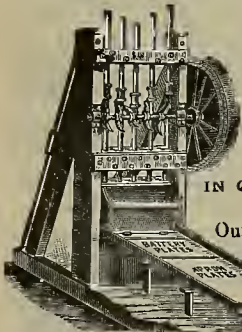
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Mining Summary.

The following is mostly condensed from journals published in the interior, in proximity to the mines mentioned.

CALIFORNIA.

Amador.

The arrangement made by S. W. Bright, who has bonded the Bellwether mine at Jackson to a Montana capitalist, is to the effect that ten stamps are to be erected within ninety days, and sixty more within fifteen months.

Calaveras.

New Incorporation.—The Gwin Mine Development Company has filed a copy of its articles of incorporation in the Clerk's office in Calaveras county. The objects of the company as set forth in the articles are to purchase, lease, develop hold and operate mining ground. Its principal place of business is in San Francisco and its capital stock is \$1,000,000, of which \$25,000 is subscribed. The directors are David McClure, Jr., of Oakland, Frederick F. Thomas of San Francisco, Edward C. Voorhees of Sutter Creek, Mortimer W. Belshaw and Charles P. Eells of San Francisco.

The Calaveras Prospect says: There is an increased activity in mining circles all over the county, and old mines are being reopened and new prospects developed every day. The county is full of prospectors, and new faces are to be seen in every mining camp, giving life and animation to old places.

Work has been resumed on the Esmeralda mine, in Calaveras county, owned by Hon. John F. Davis of Jackson. Only a small force of men is at present engaged, but the mine is being put in shape for more extended operations.

A group of four mines along the river from Robinson's Ferry, in Calaveras county, and owned by Mr. Viertong, are reported to have been sold for \$109,000.

Madera.

GAUB GULCH.—*Mercury:* There is somewhat of a boom in mining matters in Grub Gulch and Coarse Gold. The mines in both these places are looking fine and a big force of men are employed there. D. M. Tomblin's mine at Grub Gulch is looking well and considerable rich ore is being taken out. Everything about that burg is bustling on account of the mining business there. Lindey & Lee's mine at Coarse Gold is exceeding the highest expectations of the owners. A large quantity of rich ore is being taken out. A force of men will be steadily employed getting out ore. It is not intended to begin milling operations until such a body of ore is taken out that it will be sufficient for a long run. Philip E. Chapin, a capitalist of Washington, has purchased a one-third interest in the mine.

Nevada.

BIO STRIKE.—*Union:* A rich strike of gravel has been made in the Odin drift gravel mine. Gravel has been found that will pay as high as \$40 to the carload. The strike was made in the north drift, and at a depth from the surface vertically of about 175 feet. This gravel deposit is known to be fully 200 feet in length; how wide it is has not been determined yet.

THE ECLASTIC MINE.—*Telegraph:* The ten-stamp mill of the Eclastic mine has started up. The shaft is down 400 feet. The drifts at the 300 level have been run 156 feet north and 100 feet south. The ledge varies in width from 13 inches to 25 and 26 inches, and there is scarcely a piece of it but what free gold can be plainly seen. The rock is considered to be more than the average milling ore. There is now about 150 tons of the ore on the surface and there is a large amount of it opened up in the mine.

Placer.

Colfax Sentinel: At the Polar Star mine at Dutch Flat, last week, a very good prospect was found in the prospect drift that is being run from the old hydraulic pit. If a sufficient quantity of the same kind of gravel can be found, it will pay well to drift.

There is some talk of the Liberty Hill Company raising their dam in Bear River and renewing hydraulic mining at Liberty Hill. The raising of this dam would allow all mines above it to work and would include the Polar Star.

Messrs. Wilkie, Waite, Peters and Feeley have leased a piece of ground from Mr. Spaulding, and will proceed to drift and ground-slice it. The company will be known as the B. P. Co. (Bright Prospects Company.) The men comprising the company are all experienced miners and are "up to date" in mining matters.

Jerry Goodwin of Yon Bet has almost completed his arrangements for working the tailings at Red Dog by the elevator process. In the incline, considerable water has been encountered, and it will be necessary to put in a pump.

San Bernardino.

RICH ORE.—*Epitaph:* Four Redlands men, returning from the desert, brought a large quantity of ore from a prospect they discovered 18 miles northwest of Panamint. Several assays average over \$1000; a few over \$2500 a ton. Expert miners declare it is the richest ore ever exposed in southern California.

NEVADA.

Washoe District.

Following are copies of the official letters of Comstock mine superintendents for the week:

CON. CAL. & VIRGINIA.—On the 1650 level the crosscut running east from the end of the crosscut run east from the drift run north from the end of east crosscut No. 1 from the north drift from the winze—down 52 feet—has been extended 10 feet; total length, 20 feet, passing through porphyry and streaks of quartz of low assay value.

In prospecting the ore body which was en-

countered 120 feet south from the winze, when last week we cut through six feet of good ore, we have this week entered the same body at a lower depth, and have advanced a south drift therein 54 feet in solid, compact ore, and have extracted 52 carloads—about 50 tons—the average assay value of which, per car sample assays, is \$79.20 per ton. This drift is 14 feet below the sill floor of the 1650 level. The workings of last week were inadvertently reported as being 20 feet below that sill floor, whereas we have found from subsequent measurements that they should have been reported as being on the line of the sill floor.

On the 1000 level—the Knle drift—the drift running south from the crosscut run east from the drift run south from the raise (50 feet up) 353 feet south from the shaft station has been extended 20 feet; total length 36 feet, in vein matter. From the end of the south drift from this raise (50 feet up) a west crosscut has been advanced 25 feet in porphyry and quartz of low assay value. West crosscut No. 3, 590 feet from the shaft station, has been extended 25 feet; total length 55 feet, in porphyry and quartz. At a point 555 feet south from the shaft station, are cutting out on the east side of the main drift an opening from which an upraise will be carried up.

OPHIE—1465 level.—The drift run south from the crosscut run west from the main north drift, at a point 219 feet in from the mouth of the crosscut, has been extended during the week 11 feet; total length 55 feet, continuing in porphyry showing lines of quartz.

As joint work with the Mexican Company, repairs have been made in the main shaft at and near the 700-level station.

Central Tunnel.—Have been engaged during the week in repairing the old Mexican shaft station, with which the drift connected, and in catching up and retimbering the broken ground around the shaft for a distance of 37 feet.

MEXICAN—1465 level.—The upraise started near the mouth of the crosscut run west from the drift run south from the top of the upraise, which was carried up 45 feet above the sill floor of this level at a point 40 feet west from the main north drift and 100 feet north from the south line of the mine, has been carried up during the week 7 feet; total height, 81 feet; continuing in a very hard porphyry formation.

As joint work with the Ophir Company, repairs have been made during the week in the Ophir shaft at and near the 700-level station.

ALTA.—The intermediate winze is down 12 feet and the bottom shows 28 inches of high-grade ore, the assay value running from \$12 to \$250 per ton, 80 per cent of which is gold. Directly over this point and above the 725 level we are raising a header in ground that looks very encouraging because of the continued improvement as we advance. The north raise has been advanced 17 feet during the week; total length 117 feet.

HALE & NORCROSS—900 level.—Advanced the southwest drift 12 feet; total length, 204 feet; face in porphyry.

1100 level.—Advanced the main south drift 10 feet; total length, 203 feet; face in porphyry. Have started a west crosscut from the end of this drift. We are retimbering a part of the station on this level. Commenced yesterday shipping ore to the Brunswick mill.

UNION MINE—900 level.—The Union Con. and Sierra Nevada joint west crosscut started near the north line of the Union mine, from the joint north drift which was run from the joint west drift, at a point 1520 feet west of shaft, has been extended during the week 20 feet; total length, 335 feet; face in hard porphyry.

WEST CON. VA. & CAL.—During the past week the west crosscut on the 1100 level, run from a point 320 feet north of the shaft station, has been extended 28 feet, and is now in a total distance of 733 feet. The face in hard quartzite. The flow of water is unchanged since the last report.

KANTUCK.—From the east crosscut on the 1035 level we have started a south drift in ore of fair quality.

1200 level.—The south drift from the Yellow Jacket incline is in a total distance of 60 feet, the face in low-grade gold ore.

BEST & BELCHAM.—On the 800 level west crosscut No. 2, which has been run in the north drift at a point 180 feet from our south boundary, has been cleaned and repaired for a distance of 200 feet.

GONLE & CURRY.—On the 200 level west crosscut No. 5, started in the northwest drift, 432 feet from the main west drift, has been extended 25 feet; total length, 1053 feet; face in soft porphyry.

OCCIDENTAL.—From the west ledge above the 400 level we continue to extract about 8 tons of ore per week showing an average value of \$46 per ton.

ANDES—420 level.—The upraise started in the west crosscut No. 1 from the main north lateral drift was carried up 13 feet during the week, continuing in quartz.

SERRA NAVADA.—The south lateral drift from the intermediate tunnel has been advanced 26 feet; total length, 659 feet; face in hard porphyry. The joint west crosscut near the north line of the Union mine from the north drift 1520 feet west of the shaft, 900 level, has been advanced 20 feet; total length, 35 feet; face in hard porphyry.

UNION SHAFT.—Have started a joint west crosscut near the north line of the Union mine from the north drift, 1520 feet west of the shaft on the 900 level, and advanced same 20 feet; total length, 35 feet; face in hard porphyry.

CHOLLAR.—The north drift, 100 level, has been extended during the week 31 feet; total length, 170 feet; face in soft vein material composed of porphyry and streaks of quartz.

The west crosscut on this level, 300 feet south of the north line, was extended 34 feet; total

length, 166 feet; face in porphyry with streaks of low grade quartz through it.

POTOSI.—The south drift on the 450 level has been advanced 21 feet; total length, 369 feet; face porphyry, the ore streak having passed to the west of the drift. The south drift, 50 feet above the 450 level, is out 104 feet, having been advanced 22 feet; face in clay and soft porphyry.

WAAN COMBINATION SHAFT.—The west drift from the station, 820 level Ward shaft, is out 760 feet from the shaft. Progress has been slower than usual, due to soft ground with a considerable amount of water running through it, necessitating careful timbering.

BULLION.—The west drift from the station, 820 level, Ward shaft, is out 760 feet from the shaft. Progress has been slower than usual, due to soft ground with a considerable amount of water running through it, necessitating careful timbering.

SAVAGE.—On the 1050 level the north drift from the station was advanced 24 feet, making its total length 82 feet. The south drift was advanced 13 feet, making the total length 190 feet from the shaft; face in quartz and porphyry. In the west crosscut from the south-east drift, started at a point 225 feet from the shaft, they have stopped some pay ore. The upraise from the north drift, started from the east drift at a point 85 feet south of the shaft is advanced 18 feet; top in quartz giving low assays. On the 1100 level the north drift from the shaft was advanced 16 feet, making its total length 178 feet; face in favorable looking quartz and porphyry.

On the 12th floor they are extracting some pay ore.

During the week they hoisted 34 cars of ore, car samples averaging \$36.21.

BELOAR.—On the 850 level the north drift has been cleaned out and retimbered a distance of 25 feet, making its total length 390 feet from the shaft. During the week 25 tons of fair-grade ore were extracted and hoisted to the surface.

CROWN POINT.—The south drift from the top of the 700-level raise on the 600 level is now out 81 feet. The face is in a mixture of porphyry and quartz. The south drift on the 7th floor of the 700 level raise is now out 70 feet. The face is in porphyry and low-grade quartz. The south drift from the station on the 500 level is out 62 feet. The formation in the face is in a mixture of porphyry, clay and low-grade quartz.

SAG, BALONEZ.—The west crosscut from the end of the north drift on the 1150 level is now out 20 feet, having been extended nine feet since last report. The face is in a mixture of porphyry, clay and low-grade quartz.

We continue to save a few tons of fair-grade ore per week from the south raise on the 1150 level.

IOWA.—Clearing out caved ground at the mouth of the Iowa tunnel. Expect to have this tunnel cleared up and commence work in the west crosscut in a few days.

REWORKINGS.—*Enterprise:* A number of unemployed miners are working over the old waste-rock dumps at the various hoisting works in search of ore, and some of them manage to make fair wages.

A tunnel is being run into the Cumberland ground between the Iowa and West Con. Va. & Cal., and as it is about as far west as the Rowe find there is a favorable prospect that some of the stringers cut will make into a paying body, as the ore in that vicinity is exclusively gold-bearing.

There are numerous narrow surface veins of quartz on Cedar Hill that unemployed men would be willing to work on royalty if leave could be obtained from the mining companies owning the ground. These veins are too narrow and uncertain to pay a company to work, but practical miners could make a living in going out the ore.

The discovery of a four-inch vein of quartz, showing an average value of \$20 in gold per ton, has recently been made north of Jumbo district, in the vicinity of the location formerly owned by Lawyer Thomas.

A search will be made this year for the vein from which the float gold quartz drifted found near the head of Little Valley, where a hydraulic claim was worked in the early sixties.

Soda Springs District.

THE SONA SPRING MINES.—So far eleven gold-bearing mines have been discovered in Soda Springs district, Esmeralda county, on the line of the Carson and Colorado Railroad, fifty miles south of Hawthorne. One ledge five feet wide has been uncovered that shows plenty of \$200 rock. Another, four feet wide, shows up a big body of \$40 ore; and still another five-foot ledge that assays \$70 per ton. What is termed as the "waste rock" assays \$20 per ton. The district as a whole will average anywhere from \$20 to \$70 per ton. The district is attracting much attention, and the Reno Gazette says the camp is likely to contain 3000 to 4000 people before fall.

ARIZONA.

MINE BONDER.—*Journal-Miner:* A bond has been executed to C. W. Culver from Messrs. Askew, Herndon, Kingley, Thornton and Crane for the Moscow mine, the consideration being \$150,000. The mine affected by this transaction lies in the Agua Fria district, about four miles from the Bowers ranch, and is the property over which there was considerable excitement about a year ago on account of its richness. It has been in litigation until recently. Mr. Culver will leave in a few days for the East on business connected with its sale.

MOJAVE MINER: As the price of silver is dropping down toward the 50-cent notch, the Prince Albert mine, White Hills, is sending out the richest ore ever taken from that camp. The last shipment from the mine was valued at

something like 3000 ounces in silver and six ounces in gold per ton.

BRITISH COLUMBIA.

GONA BACK TO CARIBOO.—*Spokane Review:* The old Cariboo country, which in former years turned out \$60,000,000 in gold, may have a new lease of prosperity this summer. A company is now working ten miles east of Barkerville, on an enterprise which its promoters believe will result in bringing more gold to the surface than has yet come out of the district. The plan is to sink a shaft to the bottom of the old channel of Slough creek, which drains half a dozen smaller streams, each of which has in the past yielded from \$1,000,000 to \$2,500,000 in gold.

W. F. Sargent of Tacoma, secretary of the company, was in town lately and gave a description of the company's work. "We secured a Government lease two years ago," he said. "It covers a section of the Slough valley, one-half mile wide and three miles long. Then we began drilling holes at intervals of 100 feet across the valley. Finally we found the deepest point in the old channel, after passing through 40 feet of gravel, 160 feet of clay and 45 feet more of gravel to bedrock. Next we ran a drainage tunnel 2150 feet long to the top of the clay bed at the point where we are to sink the shaft. The contract for sinking the shaft has been let and we hope to have it finished so we can begin work at bedrock in July or August.

"If there is anything in it there are millions, and we are confident that we will get plenty of gold. This is the old channel through which the water ran for thousands of years before taking its present course. If the upper bars can now pay their millions year after year, what must the bedrock be like?"

COLORADO.

THE CRIPPLE CREEK SITUATION.—The Cripple Creek Crusher gives the following relative to the strike at that place: There is no gainsaying the fact that up to the present time the miners are ahead in their contest with the mine-owners. There are now 28 mines working on the old 8-hour schedule and employing in the neighborhood of 600 men, while two, with the sanction of the union, are working nine hours for \$3.25.

The total number of mines now idle by reason of the labor trouble is seven, and with full crews they would not, if all started up, employ over 300 men.

The owners of the idle mines may as well look the facts in the face; the miners and a majority of the mine-owners of the camp are against them, and unless they have a trump card of the highest value yet to play they may as well concede themselves beaten and take their medicine with as good a grace as possible.

PHARMACIST ORA IN SIGHT.—*Record:* Within the last three months the Pharmacist mine at Cripple Creek has been thoroughly inspected by two prominent experts, who figured on the ore in sight, and the lowest calculation put the figures at \$120,000. It is understood that the property is now being examined by an English expert for an English syndicate, and should negotiations fall through on the deal now pending, in two weeks the mine will be started up to earn dividends.

MINING FLOAT.—*Esquire:* The Tillie Butzel shipped \$3500 worth of ore in March, the work of about a dozen men. The ore in the Queen Bees is improving with each foot driven, the ore brought out last Saturday showing well in copper pyrite. Clear Creek County.—In Empire district, the Badger Boy has shipped eight tons of quartz, which returned \$35 per ton, while the Gold Dirt has 15 tons ready for shipment. At Yankee Hill a rich strike has been made in the Jennie Moore. The Clear Creek Placer Co. has commenced operations on its property, near Idaho Springs, Chaffee County.—The old gold camps of the sixties, near Granite, are showing signs of renewed life, and will be the scene of active operations this summer. El Paso County.—The Portland Company has bought the Queen of the Hills, Vanadium, Hidden Treasure and Baby Ruth, which were in conflict with its property, thus removing all possibility of litigation from that source. The price paid was \$100,000. At the McCloud mill an intelligent test of the cyanide process is now being made. The Appie Ellen has struck it rich—three feet of ore running from \$40 to \$300 per ton. Fifty tons of smelting ore are now ready for shipment. The Gould Company has been in great luck during the past week—a big strike in the Nil Desperandum and the adverse suit of the Pueblo Consolidated Mining Company against the Rhinoceros decided in its favor. The Something Good, of the Aola Company, shows ore covered with eylvanite. The Elkton, Raven, Moose and other old producers are keeping up their records. Gunnison County.—A custom stamp mill is about to be erected on the Cholla to treat Goose Creek ores. The Iron Cap, of this district, has a car of ore ready for shipment, which shows well in free gold. Sale of good prospects are now being made in this camp. A syndicate of Boston capitalists has taken hold of the Taylor River placers, and will spend \$100,000 this season in placing water upon them sufficient for hydraulic mining on a large scale. Lake County.—The largest cyanide mill in the State will be erected at Leadville to treat the low and medium-grade ores of the gold belt. La Plata County.—A 25-ton concentrating mill is being built at La Plata City. Development work is being pushed on some of the claims in the La Plata mountains as fast as men and money can drive. Mineral County.—The United Mines Co., at Creede, is about to enter the list of shippers. The Amethyst, New York Chance, Last Chance, Batchelor and Ridge are shipping from 20 to 25 cars of ore per day. If the price of silver advances, this will be increased materially. Keep your eyes on the Bear Creek

gold district. Ouray County—The Grand View was sold last week for \$75,000. The Osborne & Loder smelter, below Ouray, will blow in next month. It is promised that the Anstin process smelter, at Ridgway, will be ready for business September 1st. If this proves true, look out for Bright Diamond and Iron Clad stocks. Park County—Development in the Balfour district is proving the general formation to be the same as the famous Cripple Creek camp, and many practical mining men believe it to be in the same mineral-bearing zone. There is no doubt but that a number of shippers of good-grade ore will be developed there this season. Pitkin County—The Tam O'Shanter, Montezuma and Express, at Ashcroft, have large amounts of ore, mined during the winter, ready for shipment.

IDAHO.

PROPERTY BONDED.—Says the De Lamar, Idaho, *Nugget*: The Dr. Stephen H. Emmons syndicate has recently bonded the Rajah and Mammon mines, on Florida Mountain, from Messrs. Crosson, Smith and McLain, and the Banner and several other claims from the respective owners. Development work will begin as soon as practicable on these properties.

PROPERTIES AROUND HAILEY.—*Mining Area*: The Star mine has encountered a fine body of high-grade ore and is putting on more men at once. The Red Elephant mine is working thirty-three men, and is now running both day and night shift. The Red Cloud people are working forty men and have a fine body of ore. The Texas Star Gold Mining Company is employing twenty-five men. Their mill is turning out a fine gold brick each week, and shipping a carload of concentrates a week. The Fanny Warring mill is about in readiness to start up. They have plenty of ore to crush.

The Tyrannus has a fine showing. The Stormy Galore is making shipment of 400-ounce ore. The Carrie Leonard leasers have a large quantity of ore out. The Flagstaff is tapping its ore at a greater depth. The Idaho Democrat people have uncovered another rich bunch of ore. The Idaho Republican owners are getting in readiness to resume. The Washington mine is working a small force. The Hidden Treasure claim has two men at work. The Narrow Gauge mine on Deer creek is looking fine. Elk-horn gulch leasers are all regular shippers. The Philadelphia Company is doing no work, merely leasing. All the machinery of the North Star property has been pulled out, for what reason no one knows. Assessment work is being done throughout the entire belt. The Hard Times mine is working six men. The Queen of the Hills Company is working twenty men, and has bonded two adjoining claims. This is a great property, and the systematic way the new company is going to work will be a big lift to this community.

Nothing is being done at the Minnie Moore, Relief or Michigan claims, owing to the low price of silver. The O. K. mine has a good showing of rich ore. Mr. Lippman of Salt Lake has arrived and put a force of men at work on the Point Lookout mine. The Hope and Cressus mines have been sold to a Colorado syndicate. These are two very promising claims, carrying \$6 to \$20 in gold. For a number of years they have been prospected thoroughly and opened up for sale. The Independent group of mines is still idle. The Mayflower has a force of men at work; also the Bullion and Jay Gould; they all have a good showing. Twelve to fifteen cars of ore leave here weekly, and from four to six cars of bullion. The sampler is working a complement of men.

MONTANA.

THE COLORADO SMELTER FIRE.—Butte *Inter-Mountain*: Henry Wolcott of Denver, the secretary and treasurer of the Colorado Smelting and Mining Company, says that the Colorado smelter, which was consumed by fire, will be rebuilt at once. The amount of the damage is estimated at about \$100,000. It is said there is no insurance on the works.

NEW MEXICO.

CENTRAL DISTRICT.—*Enterprise*: The Texas mine shows no diminution of the ore bodies. Another shipment of rich ore is nearly ready to send to the smelters. The returns from the last shipment of two lots of ore and one lot of concentrates gave returns as follows: Ore, lot No. 1, 388 ounces silver and one ounce gold per ton. Ore, lot No. 2, 274 ounces silver and one ounce gold per ton. Concentrates, 407 1/2 ounces silver and 7.4 ounces gold per ton. The concentrates were from the refuse or low-grade ore, of which there are thousands of tons lying on the dump, from which the higher grade ore was assorted and shipped.

The Owens & Porter mill has been shipping bullion and concentrates.

WASHINGTON.

OREVILLE, Okanogan County, Wash.—Prospects and times look promising for the Okanogan country. Depression in the price of silver has caused attention to be given to the old placer camps and the gold belt of north-eastern Okanogan county. Numbers of miners and prospectors are daily arriving, and at present there are more than 100 men washing and sluicing on the Similkameen river from one to ten miles above the town of Oroville. Extensive development is being done upon the several properties extending from Loomiston to the British line. A syndicate has bonded the Black Bear and War Eagle on Palmer mountain, and has let a contract to sink the shaft of Black Bear a depth of 300 feet.

OREGON.

JOSEPHINE COUNTY.—*Courier*: Woolfolk & Son are running an arrastra by horse power on their ledge in Dry Diggings, and the ore is fairly yellow with gold. The formation is a mixture of decomposed quartz and granite and there is big pay in the crushings. The owners are pre-

paring to run their arrastras with water power. J. C. and A. E. Root are developing the Black Bess ledge on Coyote creek in company with L. G. Geary. The vein of gold-bearing quartz has been traced under the mountain, and it is found cropping out unmistakably on the Wolf creek side.

The Ennis-Cameron placers on Galice creek are being operated night and day and there is an abundance of water for four months yet. The wages paid miners on this property range from \$2.50 to \$3.50 per day.

The Garrett ledge on Bamhoo gulch near Williams creek is paying wonderfully, \$20 to the pan being taken out by a crude mortar process. This is not a pocket, but a very rich ledge which bears every indication of permanency.

GEANT COUNTY.—The placer mines of northern Grant have started up business, and many hydraulics are spouting with every assurance of a long and continued water supply. The miners say that if gold straight is to be the rule, it is well enough to dig and get action on it.

There are now 60 men at work on the Hampton mining ditch in the Grave Creek district, and it is thought the construction will be finished in May. The company has 760 acres of rich placer ground which is covered by the ditch, and will utilize the whole flow of Grave creek in its operations.

SOUTH DAKOTA.

DEEPEST SHAFT IN THE HILLS.—Deadwood *Pioneer*: The contract has been let to sink the Star shaft of the Homestake mine 100 feet deeper. The shaft is now down 800 feet. The contract was awarded to the contractor who put the shaft down 200 feet below the 600-foot level. In reality the shaft will be, when this last shaft shall have been sunk, 930 feet deep, as there will be a 30-foot sump driven below the last station.

Coast Industrial Notes.

—The Western Sugar Refinery has reduced prices of all grades 1/4c.

—Santa Fe boiler-makers who have been on a strike in San Bernardino have returned to work.

—The Nelson shingle mill at Anacortes, Wash., shipped 5,850,000 shingles East during March.

—About 200 Canadian Pacific employees have been laid off in the machine shops of the railroad at Vancouver, B. C.

The Placerville Electric Light Company has secured a 1000-light plant from the Pacific Electrical Storage Company of this city.

—It is thought that the interest on the O. R. and N. Co.'s mortgage 5's and 6's will be defaulted for December, which would occasion foreclosure proceedings.

—The reports of rainfall for the present season credit Auburn with 30.72 inches of rain and Newcastle with but 14.56 inches, though the two places are only four miles apart.

—Some weeks ago A. Lusk & Co., canners, were forced into insolvency. The assets were appraised at \$204,000, but the returns show that only \$784 was realized from their sale.

—Four cents is the ruling price for sheep-shearing in Grant county, Or., this season. It is "not wages," but has to be put up with, along with the reductions in other occupations.

—Out of 187 plans submitted for Washington's new State Capitol building the Commission has selected that of Ernest Flagg of New York. The building will cost \$1,000,000.

—There are now 15 oil wells flowing near Los Angeles. The yield is steadily increasing, as new wells are being bored all the time. The oil finds a ready market at \$1.50 to \$2 a barrel.

—The experiment of bringing crude oil from Peru is a success. The Bawnmore, chartered by J. W. Grace & Co., brings 840,000 gallons, which finds ready purchase by the San Francisco gas companies.

—The unwisdom of forcing sale of city property at present is illustrated in the case of the property of the State Investment Co. A year ago it was valued at \$155,000. Last week it was sold at forced sale for \$79,670.

—The mills of Vancouver are exporting a good deal of lumber to Australia and Chili. The mills sell at \$7.50 per M. by the shipload, ordinary lumber, and the Tacoma *Ledger* says they take things easy all the while.

—The Gray's Harbor Commercial Company is filling an order for 50,000 feet of fir and spruce finish to go into a cruiser which the Cramps' shipyard at Chester, Pa., is getting ready. This is the first order from them.

—The Inyo *Register* says: "It is to be hoped in the name of humanity that the newspapers on the other side will stop publishing the absolutely untrue story that men can obtain work on the 'Mt. Whitney canal' at big wages, and cash twice a

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month. So far they can get no cash at all—there has never yet been a pay-day. There is no certainty as to the time when there will be."

—Trainloads of sheep and cattle are being moved from the San Joaquin and Salinas valleys to the stock ranges in Utah and Nevada, where the pasturage is uncommonly good this season. An emergency rate of from \$25 to \$60 a car has been made.

—The Metropolitan Street Car Company are putting in a Thompson-Corliss tandem compound engine of 700-horse power in their First avenue power-house, and will add ten new cars to their plant. They propose opening a branch from Ninth avenue to the ocean.

—The Truckee *Republican* says the mill-saws of the Truckee Lumber Company make welcome music in the air, announcing the opening of the lumber season. Both sides of the mill are running, and 70,000 feet per day are being turned out. Nearly 2,000,000 feet of logs are in the pond, and the Donner and Tahoe railroad will be ready to rush in 75,000 feet per day additional in a couple of weeks. The company intends to saw 10,000,000 feet of lumber this year, which will be the largest cut made in twenty years.

—Talking of the available rights of the South Yuba Water Co. and its value as a motor, Dr. Chas. Van Norden, the Auburn director of the company, says: "We could have 3000-horse power in Sacramento in a very short time. We have water enough at Newcastle for that amount now, and could get more very soon, as soon as it would be needed. We could furnish over 50,000-horse power; that is, by taking the water from our 42 canals, which aggregate 380 miles. Besides this, we are continually improving and adding others to our system. We have over \$1,500,000 of actual money in this work, and counting what we inherited, it would bring up the actual cost of the plant to over \$3,000,000."

—The following local incorporations disbursed dividends during April:

Name.	Rate.	Amount.
*Bank of California....	\$ 75 per share....	\$12,500
*Nevada Bank.....	1 1/2 per cent....	45,000
*Sather Banking Co....	1 1/2 per cent....	15,000
*Fireman's Fund Ins. Co.	3 per cent....	30,000
*Pacific Surety Co....	2 per cent....	2,000
*Sun Insurance.....	2 1/2 per cent....	7,500
*Capital Gas Co.....	\$1 00 per share....	10,000
Cal. Electric Light.....	15c per share....	7,500
Edisoo L. and P. Co....	8 per cent....	10,666
Oakland Gas Co.....	200 per share....	6,000
Pac. Gas Improvmt Co...	50c per share....	15,000
S. F. Gas Light Co....	35c per share....	35,000
Contra Costa Water Co.	50c per share....	15,000
*Marin Co. Water Co....	75c per share....	4,500
Spring Valley Water Co.	50c per share....	58,000
Altaotic Dyomite Co....	40c per share....	12,000
California St. Cable....	50c per share....	5,000
Metropolitao R'y Co....	100 per share....	1,000
Alaska Packers' Ass'n....	75c per share....	.....
Pacific Transfer Co....	50c per share....	2,000
United Carriage Co....	50c per share....	1,250
Alaska-Treadwell M. Co.	37 1/2 c per share....	75,000
Highland Mining Co....	20c per share....	10,000
Homestake Mining Co....	15c per share....	18,750
Mayflower Gravel M Co.	10c per share....	10,005
*Napa Coo Quicks'r M. Co.	10c per share....	10,000
Total.....		\$519,166

*Quarterly.

A summary of the dividends for the month compare as follows:

	1893.	1894.
Banks.....	\$172,500	\$172,500
Insurance Companies.....	43,000	39,500
Gas Companies.....	74,000	84,166
Water Companies.....	74,500	78,000
Powder Companies.....	19,500	12,000
Street R. R. Companies.....	10,000	6,000
Mining Companies.....	164,300	123,750
Miscellaneous Companies.....	15,000	3,250
Totals.....	\$572,800	\$519,166

Market Reports.

The Markets.

SAN FRANCISCO, May 3, 1894. Silver declined and advanced during the week, going down to 63½ and appreciating to 64½. Those whose position lends warrant to their opinions think it will be more buoyant as the summer wears on. The drop in the early part of the week was occasioned by an authentic denial of the rumor that the India mints would be reopened. The international bimetallic conference, now in session in London, will, it is believed, by the result of its deliberations, give tone to the market.

The money market has been of inadequate supply during the week, greatly owing to the unusual plethora of the Bank of England's resources. During the week that institution had, as reserve, \$23,250,000, the highest amount on record. As noted elsewhere, local corporations disbursed during April dividends aggregating \$519,166. The local bank clearings in April were \$56,629,775; they were \$61,520,063 in April, 1893; making the totals so far this year \$213,264,599, against \$254,849,807 for the first four months of 1893.

The local bullion, money and exchange quotations current are as follows:

Commercial Loans, per cent per annum.....	7@8
Commercial Loans, prime.....	6@9
Call Loans, gilt-edged.....	7@8
Call Loans, mixed securities.....	7@8
Mortgages, prime, taxes paid by tender.....	7
New York Sight Draft.....	12½c
New York Telegraphic Transfer.....	17½c
London Bankers', 60 days.....	\$4 88½
London Merchants'.....	\$4 86½
London Sight Bankers'.....	\$4 89½
Refined Silver, per ounce.....	64½
Mexican Dollars, nominal.....	52@52½

New York Prices.

NEW YORK, May 3.—Following are the closing prices for the week:

	Silver in	Copper	Lead	Tin
Thursday.....	29½	64		
Friday.....	29½	63½	9 50	19 60
Saturday.....	29½	63½	9 55	19 60
Monday.....	29	63½		
Tuesday.....	29½	63½	9 55	19 60
Wednesday.....	29½	64½		

San Francisco Metal and Coal Market.

ANTIMONY.	QUICKSILVER.
Per lb.....	@ 13
Refined, in car lots.....	@ 71
Powdered, do.....	@ 71
Concentrated, do.....	@ 71
All grades jobbing at advance.....	
COPPER.	
Bolt.....	@ 23
Sheeting.....	@ 23
Ingot, jobbing.....	@ 20
Do, wholesale.....	@ 15
IRON.	
Bar, base.....	@ 21
Norway, base.....	@ 41
PIG IRON.	
Spot.....	@ 21
Export from yard.....	@ 21
Wellington.....	@ 21
Ore.....	@ 21
Namalo.....	@ 21
Gilman.....	@ 21
Seattle.....	@ 21
Am. Soft No. 1.....	@ 21
Shots No. 1.....	@ 21
Putty Sound.....	@ 21
Clay Lane White.....	@ 21
Langdon.....	@ 21
Gartsherr.....	@ 21
Barrow.....	@ 21
Carbide.....	@ 21
LEAD.	
Spot.....	@ 21
Drop, sizes smaller than B, ½ bag of 25 lbs.....	@ 21
Do, ½ bag of 25 lbs.....	@ 21
Do, 1 bag of 25 lbs.....	@ 21
Do, 2 bags of 25 lbs.....	@ 21
Do, 3 bags of 25 lbs.....	@ 21
Do, 4 bags of 25 lbs.....	@ 21
Do, 5 bags of 25 lbs.....	@ 21
Do, 6 bags of 25 lbs.....	@ 21
Do, 7 bags of 25 lbs.....	@ 21
Do, 8 bags of 25 lbs.....	@ 21
Do, 9 bags of 25 lbs.....	@ 21
Do, 10 bags of 25 lbs.....	@ 21
Do, 11 bags of 25 lbs.....	@ 21
Do, 12 bags of 25 lbs.....	@ 21
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Do, 97 bags of 25 lbs.....	@ 21
Do, 98 bags of 25 lbs.....	@ 21
Do, 99 bags of 25 lbs.....	@ 21
Do, 100 bags of 25 lbs.....	@ 21

Board Sales of Mining Stocks.

S. F. Stock Board.

THURSDAY, May 3, 1894.

9:30 A. M. SESSION.

200 Alpha.....	200 350	960
200 Beta.....	130 400 G & C.....	110
500 Alpha.....	450 50.....	115
750 Alpha.....	750 200 H & N.....	760
50 Baltimore.....	10 200.....	770
800 Bullion.....	130 100.....	780
200 Bodie.....	200 300 Justice.....	790
150.....	215 100.....	300
100.....	225 100 Kentuck.....	160
550 Best & Belcher.....	215 600 L Wash.....	60
200 Bonanza.....	250 100 Mono.....	50
300 Bullion.....	500 100 Overman.....	430
100 Chollar.....	710 1500 Savage.....	950
1000 Imperial.....	50 150.....	930
100 Con. Cal. & Va.....	50 150.....	940
200.....	50 150.....	950
100 Crown Point.....	500 300 Utah.....	110
400.....	970.....	
230 P. M. SESSION.		
150 Alpha.....	450 300.....	115
300 Alpha.....	470 400 H & N.....	650
350 Andes.....	400 50.....	810
200 Bullion.....	130 100 Justice.....	300
700 B & B.....	235 100 Julius.....	50
200 Bodie.....	255 400 L Wash.....	60
50.....	215 100 Mono.....	160
350 Bullion.....	500 100 Overman.....	430
500 Bullion.....	170 50.....	80
500 Challenge.....	750 600 Nov. Q.....	80
200 Chollar.....	830 100 N G & C.....	100
300.....	800 600 Occidental.....	200
50 C. C. & Va.....	50 150.....	130
840.....	50 150.....	430
350.....	700 100.....	440
500 Echoquer.....	100 250 Savage.....	980
750 Crown Point.....	100 600.....	990
200.....	100 600 Seg Belcher.....	200
300 G & C.....	120 150 Scorpion.....	30

Mining Share Market.

SAN FRANCISCO, May 3, 1894.

The mining share market developed unusual strength during the week, and those who prophesied a setback in comparison to last week's prices found their mistake to be a costly one where opinions were backed by coin. At the delinquent sale of the Con. Cal. & Virginia but 6100 shares of the 216,000 were offered, and at the Andes delinquent sale only 820 of the 100,000 shares were offered. Con. Cal. & Virginia sold up to \$6, and the other

MINING SHAREHOLDERS' DIRECTORY.

COMPILED EVERY THURSDAY FROM ADVERTISEMENTS IN THE MINING AND SCIENTIFIC PRESS AND OTHER S. F. JOURNALS

COMPANY AND LOCATION.	NO. AMT.	LEVIED, DELINQ. AND SALE.	SECRETARY.
Belcher S M Co, Nevada.....	46.....	Mar 13, April 17, May 6.....	C L Perkins, Mills Bldg
Best & Belcher M Co, Nevada.....	17.....	Apr 30, June 5, June 20.....	L O'Brien, 309 Montgomery
Bodie Cons M Co, California.....	18.....	Mar 10, April 16, May 14.....	M E Willis, 414 California
Caledonia O M Co, South Dakota.....	16.....	Mar 8, April 10, May 10.....	F G Drown, Mills Bldg
Challenge Cons M Co, Nev.....	16.....	Apr 3, May 8, May 29.....	O L McCoy, Mills Bldg
Chollar M Co, Nevada.....	33.....	Mar 21, Apr 24, May 16.....	Obas E Elliot, New Block
Clinton Cons M Co, Cal.....	4.....	Apr 4, May 14, June 2.....	O E Gunn, Mills Bldg
Crown Point G & S M Co, Nevada.....	51.....	Apr 23, May 26, June 18.....	Jas Newlands, Mills Building
East Sierra Nevada M Co, Nevada.....	3.....	Jan 10, May 15, June 8.....	Geo E Spiney, 310 Pine
Eclipse Mining Co, Cal.....	6.....	Apr 11, May 12, June 2.....	Otto tum Sudet, 216 Bush
El Leopoldo G & S M Co, Mexico.....	6.....	Mar 22, May 10, May 21.....	Jabez Howes, 214 Pine
Evening Star M Co, Cal.....	13.....	Mar 27, May 3, May 24.....	J J Scott, 320 Sansome
Golden Prize M Co, Cal.....	6.....	Apr 23, May 26, June 18.....	O D Bennett, 309 Montgomery
Gray Eagle M Co, Cal.....	36.....	Apr 20, May 29, June 19.....	C C Harvey, 309 Montgomery
Hale & Norcross M Co, Nevada.....	105.....	May 1, June 5, June 28.....	A B Thompson, 309 Montgomery
Hazard G M Co, Calif.....	2.....	Apr 28, June 1, June 16.....	C E Kelly, 213 Sansome
Jackrabbit M & M Co, California.....	6.....	Mar 27, Apr 24, May 11.....	F Helling, Crocker Bldg
Osborn Hill M Co, Cal.....	2.....	Apr 2, May 7, May 28.....	H E Grayson, 331 Pine
Pine Hill G & S M Co, Cal.....	4.....	Apr 13, May 19, June 9.....	C A Hare, Pier 5
Silver King M Co, Arizona.....	10.....	May 2, June 11, July 9.....	J W Pew, 310 Pine
West Cons, Cal. & Va, Nevada.....	2.....	Apr 10, May 12, May 31.....	P H Andrews, 324 Pine
COMPANY AND LOCATION.	MEETING.	SECRETARY AND OFFICE IN S. F.	DATE.
Church M Co.....	Annual.....	O O Harvey, 309 Montgomery.....	May 7
East Sierra M Co.....	Annual.....	Geo R Spiney, 310 Pine.....	May 14
Goleta M Co.....	Annual.....	D M Kent, 330 Pine.....	May 9
Guld M Co.....	Annual.....	H Wagoner, Crocker Building.....	May 7
Justice M Co.....	Annual.....	R E Kelly, 309 Montgomery.....	May 9
Magenta Cons G M Co.....	Annual.....	D A Jennings.....	May 9
Monterey M Co.....	Annual.....	D M Kent, 330 Pine.....	May 9
Morgan Mining Co, California.....	Annual.....	L O Bross, 230 Montgomery.....	May 5
Moss Hill M Co.....	Annual.....	D A Jennings.....	May 9
New York Gold Hill M Co.....	Annual.....	D A Jennings.....	May 9
North Star M Co.....	Annual.....	D A Jennings.....	May 9
Original Empire M & M Co.....	Annual.....	D A Jennings, 401 California.....	May 9
Scorpion M Co.....	Annual.....	D M Kent, 330 Pine.....	May 17
Sterling M Co.....	Annual.....	D A Jennings.....	May 9
Tullis G M Co.....	Annual.....	J B Hughes.....	May 7

stocks shared to the advance. More men have been put at work in the Con. Cal. & Virginia, Ophir, Belcher and other mines, and during the week but two of the Comstock superintendents were absent from their posts.

This morning Con. Cal. & Virginia ran up to \$6 62½ on sales between boards, and prices were up all along the line. It looks as though there was more in this than "the regular spring advance," the favorable reports from the mines and the piles of idle money in the banks favoring the present upward movement.

Northwestern Incorporations.

—The following are recent Northwestern incorporations:

The Spectacle Lake Gold Mining & Milling Co., at Loomis, Wash. Capital stock, \$1,000,000, with shares at \$1 each. Incorporators: G. W. Adrian, W. M. Adrian, of Loomis, Wash., Wm. Foule of St. Paul, Minn.

The Canadian Northwest Mining Co., at Helena, Mont. Registered in British Columbia. Capital stock, \$2,000,000, with shares at \$5 each.

The Gold Cable Mining & Milling Co., at Tacoma, Wash. Capital stock, \$1,200,000. Incorporators: C. W. Moorill, J. Q. Mason, E. L. Shaffer, C. M. Johnson, R. A. Crothers, L. U. Loomis, T. H. Donavon, G. J. Turrell, F. M. Wade, J. L. McMurray, R. Metcalf.

The Chassel Gold Mining Co., at Basin, Mont. Capital stock, \$500,000, with shares at \$1 each. Incorporators: Geo. Pease, J. H. Rule, Louis Sponheim, O. A. Lanning, of Basin, Geo. Robertson of Butte, Mont.

The Eureka Mining & Real Estate Co. of Leavenworth, Wash. Capital stock, \$1,000,000. Incorporators: M. Donehoe, S. Silvertown, John Bjork, Gus Bjork, L. G. English, Frank Lewis.

The Kootenay & Columbia Prospecting & Mining Co., Limited, of Ottawa, Ontario, with branch office in British Columbia. Capital stock, \$40,000, with shares at \$100 each.

The Swank Chief Gold Mining Co., at Ellensburg, Wash. Capital stock, \$200,000, with shares \$10 each. Incorporators: James Hamilton Lewis, Donald McLeod, L. H. Jansin, Chas. Wilen, John W. Stewart.

Patents Issued to Pacific Coast Inventors.

Reported by Dewey & Co., Pioneer Patent Solicitors for Pacific Coast, 220 Market St., S. F.

FOR THE WEEK ENDING APRIL 24, 1894.

516,734.—GUN SIGHT.—F. W. Dobbels, S. F.
516,800.—KILN.—G. C. Firestone, Benicia, Cal.
516,835.—SHOULDER BRACKET.—J. W. Flowers, Newport, Or.
516,839.—UNITING BALD WIRE.—C. C. Frame, Pasadena, Cal.
516,850.—WATER WHEEL.—A. J. Gould, Quincy, Cal.
516,755.—SWITCH.—G. W. Harner, Holbrook, A. T.
516,844.—METALLIC PACKING.—F. A. Ives, Grant's Pass, Or.
516,745.—GATE.—John Mason, Petaluma, Cal.
516,823.—LUBRICATOR.—McIntyre & Sprague, Redlands, Cal.
516,856.—SAW HANDLE.—A. B. Van Campen, Raymond, Cal.
NOTE.—Copies of U. S. and Foreign patents furnished by Dewey & Co. in the shortest time possible (by mail for telegraphic order). American and Foreign patents obtained and general patent business for Pacific Coast inventors transacted with perfect security, at reasonable rates, and in the shortest possible time.

—The Panama Railway Company has notified the Pacific Mail Steamship Company that it will not renew its charter of the Pacific Mail steamers on the Atlantic. The contract expires on June 15th. The Panama Company has been paying the Pacific Mail \$9000 a month for the steamers. The Panama Company's officers say the company will remain in business.

INSTRUCTION BY MAIL

IN ARCHITECTURE, ARCHITECTURAL DRAWING, PLUMBING, HEATING AND VENTILATION, BRIDGE ENGINEERING, RAILROAD ENGINEERING, SURVEYING AND MAPPING, ELECTRICAL ENGINEERING, MECHANICAL DRAWING, MECHANICS, ENGLISH BRANCHES, and

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DEWEY & CO., Patent Agents, 220 Market St., Elevator, 12 Front St., S. F. TELEPHONE No. 658.

A. T. DEWEY. W. B. EWER. GEO. H. STRONG

The Explorers' and Assayers' Companion.

A Third Edition of selected portions of the "Explorers', Miners', and Metallurgists' Companion."

A practical exposition of the various departments of Geology, Exploration, Mining, Engineering, Assaying, and Metallurgy. Price, \$4.00 post-paid. Sold by DEWEY PUBLISHING CO., Publishers, 220 Market St., San Francisco.

By J. S. PHILLIPS, M. E. The work is divided into four parts—Rocks, Veins, Testing and Assaying. The geological chapters are intended to give miners a practical idea of the various formations. The chapters on mineral veins are derived from long observation, and the section on exploration has been carefully considered. All that relates to discrimination and assay of minerals has been kept as free from formulae as possible. The work is written for practical men, and all the explanations and descriptions are clear and to the point. It is so prepared that it is useful to uneducated men as well as scientists.

J. F. CROSETT, Commission Mining Agency, 626 Sacramento St., San Francisco, Cal.

Buy and Sell Meritorious Mining Properties. I have orders for Income-Paying Mines at the present time. Have also some good properties for sale. I want more mines to offer to purchasers and also desire more purchasers to examine properties I have to offer. Correspondence solicited.

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IF YOU ARE DRILLING ROCK

— WITHOUT —

INGERSOLL-SARGEANT LATEST IMPROVED DRILLS and COMPRESSORS

YOU ARE LOSING MONEY.

— WRITE FOR CATALOGUE TO —

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{ PATENTED
Sept. 19, 1893. }

CHEAPEST, SIMPLEST, MOST DURABLE AND CLOSEST SAVING CONCENTRATOR IN USE.

{ FRANK BARRERE,
Secretary and Manager. }

CAN BE SEEN IN OPERATION AT THE COMPANY'S WORKS, 180 MAIN STREET, SAN FRANCISCO.....OFFICE, 116 DAVIS STREET

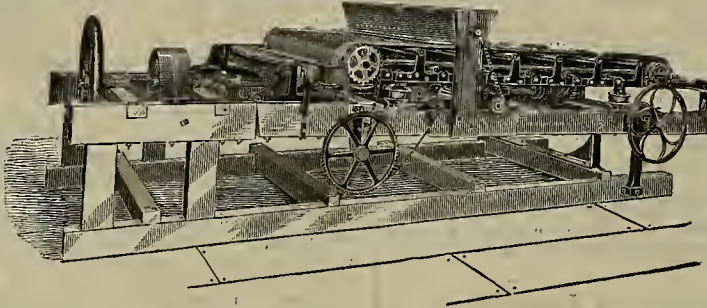
NINETY-FOUR AND ONE-HALF PER CENT

— SAVED —

ON ORES DIFFICULT TO CONCENTRATE:

A MARVEL of Simplicity, Durability and Effectiveness, combining both Side and End Motion with a Bumping Belt. SPEED AND INCLINE of belt and amount of PERCUSSION easily and quickly regulated, WHILE IN OPERATION. CAPACITY about ten tons. Only one-tenth horse power required. Adapted for either canvas or rubber belts.

PRICE.....\$350 EACH,
Including Four-Foot Prepared Canvas Belt.



FALLS MINE, IGO, SHASTA CO., CAL., May 25th, 1893.

THE MCGLEW CONCENTRATOR COMPANY: I take much pleasure in endorsing your very superior Ore Concentrator. When I was requested to examine your concentrator, I did so under protest, declaring that I would have none other than a Frue, as after many years experience with different concentrators, I believed them to be the best.

Now, after a thorough trial of the McGlew Ore Concentrator, on ore difficult of concentration, I emphatically pronounce it the best concentrator of any I have ever used in handling my ores. It is doing CLEANER and CLOSER work than I had believed possible for any concentrator to accomplish.

Samples of pulp and tailings, taken every hour, dried, milled and assayed, show * * * from West ledge, a saving by your concentrator of 9 1/4 per cent; from East ledge, * * * a saving of 92 per cent.

The concentrator runs very easy and requires but slight attention. One man attends to rock-breaker, crusher and concentrator. You have a good concentrator, and it can be relied upon to handle any ore that will concentrate. I most heartily recommend it to the mining public. Yours respectfully,
E. L. BALLOU, Propr. Ballou Reduction Works.

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CORNER FIRST AND MISSION STS., SAN FRANCISCO, CAL.

MANUFACTURERS OF

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FOR THE CONVENIENCE OF OUR READERS IN THE MINING COUNTIES WE PRINT IN LEGAL SIZE, 12x36 INCHES, THE MINE BELL SIGNALS AND RULES provided for in the Voorhies Act, passed by the State Legislature and approved March 8, 1893. The law is entitled "An Act to Establish a Uniform System of Mine Bell Signals to Be Used in All Mines Operated in the State of California, for the Protection of Miners." We can furnish these Signals and Rules, printed on cloth, so as to withstand dampness, for 50 cents a copy. MINING AND SCIENTIFIC PRESS, 220 Market St., San Francisco.

MINING AND SCIENTIFIC PRESS.

AND PACIFIC ELECTRICAL REVIEW.

An Illustrated Journal of Mining, Mechanics and Popular Science.

VOLUME LXVIII
Number 19.

SAN FRANCISCO, SATURDAY, MAY 12, 1894.

Three Dollars per Annum.
SINGLE COPIES, 10 CENTS.

Waterloo Mills and Mines.

We present an illustration showing the larger of the two stamp mills of the Waterloo Mining Company, which are on the north side of the Mojave river, opposite the town of Daggett, on the Atlantic & Pacific Railroad, in San Bernardino county. The mill shown in the illustration runs 60 stamps, weighing 850 pounds each, with a drop of $6\frac{1}{2}$ inches 100 times per minute. The smaller mill, only a short distance away, has only 15 stamps. The capacity of these stamps is about three tons of ore to each stamp, or about 225 tons for the two mills, each 24 hours.

The mine is located about six miles north of the mills, in the West Calico mining district, about two miles west of the town of Calico, and the company has constructed a narrow-gauge railroad to connect the mine with the mills. The mine is developed by the running of various tunnels on different levels, all through pay ore. The ore body is from 10 to 85 feet in thickness and, so far as known, about 600 feet in length. No water has been encountered in the mine. The ore, it is said, runs about \$25 to the ton, or would if silver was as valuable as it was in former days.

The large mill has been shut down for three years past, on account of the high price of power and the low price of silver. It is said that the power used now costs about \$300 per horse power a year. The cost of milling the ore at present is \$4.50 per ton. With cheaper power this mine and mill could be run at a profit, even with the low price of silver now current.

The company owning the Minneola canal propose to furnish that cheaper power. Ten miles below the head of their canal there is a drop of 100 feet, which will furnish about 2000-horse power if the supply of water meets the



MILLS OF THE WATERLOO MINING COMPANY, SAN BERNARDINO COUNTY.

lowest estimates of the engineers. This power can be converted into electricity and conveyed to any mills in the valley that may need the power, and it can be furnished at one-fourth the cost of power by steam.

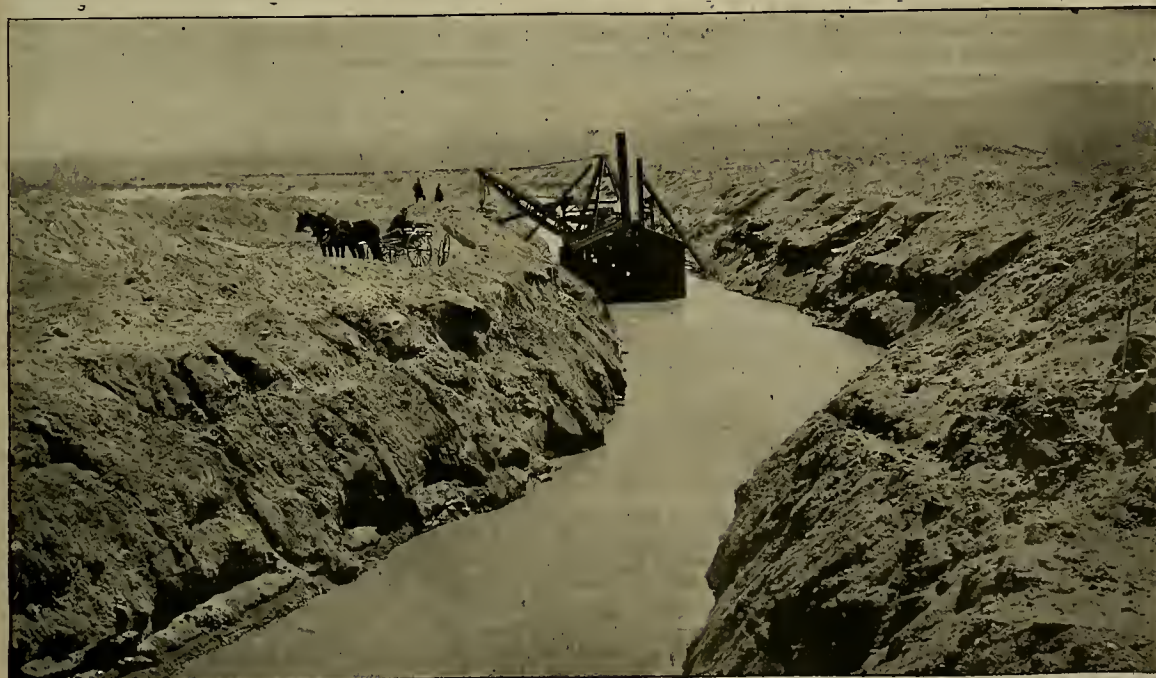
With this cheap power every mill in that region can be run, even with the present low price of silver; other mills can be erected and other mines opened which are non-producers to-day and must forever remain so until a cheaper power can be had.

THE inexorable law of supply and demand finds present

illustration in the silver shipments from this country to India via Russia. A mint recently constructed at Bombay is reported coining large amounts of "Mexican" silver dollars for the Chinese and Japanese trade. It also transpires that the silver-bullion shipments from the United States are mainly going to Russia and thence to India and Japan, Russia using portable mints for the coinage of rupees en route. The statement is made with some lack of authoritativeness, that "American" silver dollars are being made in large quantities in Mexico and shipped to England, and that 800,000 "English" shillings were recently imported into that country from Mexican mints, the fraud not being discovered till it was observed that the foreign mintage had a little more silver in it than the genuine article. The whole thing is mainly illustrative of the fact that water will find its level, and that some things can be done as well as others.

JUDGE HOLLEMAN at Wardner, Idaho, last week made a decision of considerable interest to mining men. In the case of Peterson vs. The Helena & Frisco Mining Co. the jury had given the plaintiff a verdict for \$11,500. There was a riot at Gsm, Idaho, in July, 1892, and Peterson was injured by an explosion that destroyed the Frisco mill. He was an employe of the company, and sued for damages by reason of injuries sustained. The trial took place at Rathdrum, Idaho, resulting as stated. Judge Holleman now sets the verdict aside, on the ground that the defendant was not responsible for the injuries, as they were caused by a mob over which defendant had no control. A new trial is ordered.

THE decline of the "sack" is evinced by a proposition to have both State conventions nominate candidates for the United States Senate.



DREDGER AT WORK ON THE MINNEOLA CANAL, SAN BERNARDINO COUNTY.—See next page.

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San Francisco, May 12, 1894.

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Coxey has been found guilty of walking on the grass in Washington, D. C., and the country breathes easier.

SILVER DOLLARS are good things in one's pocket. Business Manager Eliot of the *Chronicle* of this city found one very useful last Monday. A crazy crank tried to shoot him, and nothing but a silver dollar in Mr. Eliot's trousers pocket kept the bullet from severing the femoral artery, with probably fatal result.

'Twas Carlyle who said, "We are the creatures of our environments," and invented the last word quoted to convey his meaning. The idea is exemplified by geographical surroundings, as in Oklahoma, where two men were lynched for stealing a horse, while the same day, in another part of the country, two other men were applauded for stealing a railway train, locomotive and all.

AS TO be expected in a new State, the commonwealth of Washington is not too conservative to make singular experiments. The Mineral Creek district mine owners in the western part of that State propose, so far as within them lies, to counteract the difficulty occasioned by what is deemed an insufficient currency, and have issued stock certificates in coin form, the silver in the certificates being from their own mines. They are silver certificates in every sense of the word, and combine the useful and the ornamental in an eminent degree. The price of the shares is set at one dollar each, and the coiners hold that their mintage will serve every purpose of local traffic just as well as silver dollars coined by Uncle Sam. If the fashion be followed by other silver mine owners, it will add another singular phase to a situation that already presents many striking conditions.

"RAILROADING made easy, or every man his own railroad builder," is not the title of a circular issued by a prominent official of the Populist party in Kansas, though it might with propriety be so termed. It is a plan evolved by the members of that scopy party, and proposes to build a "North and South Railroad" to connect Kansas and the Gulf of Mexico. The farmers who live along the line of the road are to build it, pay for it and own it. They are to buy hundred-dollar shares of stock and get with each share twenty-two five-dollar transportation certificates. When the road is finished these certificates will be taken as cash for one-half the price of freight or passage. Income construction bonds will be issued in shares of five, ten and twenty dollars. They are to carry five per cent interest and are to be paid out of the road's income and are to be received for all dues, with an added premium of five per cent. There is evidently money in it for somebody, but whether for the farmers or some one else remains to be proved. The plan ought to take—in Kansas,

California's Wealth.

People whose attention is not wholly occupied in contemplating the commonweal movement may find pleasure in the recent publications from the Census Office regarding California's wealth, where it is proclaimed, with becoming pride, that property in this State in 1890 (during the temporary absence of the Assessor) was worth \$2,533,733,627. That is a good deal of money, and divided pro rata among the number of us here in 1890, would give each man, woman and child \$2,097. The fact that no equal division is thus made arouses discontent in the minds of those whose individual possessions fall in cash value below that figure. The further fact that several of our fellow citizens have varying control of sums ranging from \$1,000,000 to \$20,000,000, while others of our fellow citizens are emigrating by reason of inability to earn a living, is not wholly conducive to general satisfaction, and tends to modify the joy apparent on seeing those figures.

It is not to be denied that the wealth is here. The United States census says so, and that settles it. It would, however, be better for the commonwealth were the actual average nearer the per capita indicated.

If the State wealth four years ago aggregated the sum given, it is fair to assume the true value of property in this State in 1894 totalizes the enormous sum of three thousand millions of dollars—nearly one-half as much as the total wealth of the United States when gold was discovered here.

In any event it is gratifying to State pride to observe by the following table the great and constant growth of California's wealth for forty years.

	Total.	Per Capita.
1850.....	\$22,161,872	\$239
1860.....	207,874,613	547
1870.....	638,767,017	1,140
1880.....	1,343,000,000	1,553
1890.....	2,533,733,627	2,097

An Untimely Taking Off.

The death of Colonel Robinson in London is likely to ultimately affect the problem of profitable production of tin in this State. The Colonel, as a mining engineer and mine promoter, had few superiors in California. He promoted the sale of the tin and gold mines of the Temescal range of mountains, in London three years ago, by organizing a company known as the "San Jacinto Estate, Limited." The Colonel was appointed manager of the property and proceeded to develop it by building mills and reduction works, dams for conserving water and developing the mines. J. H. Crossman took charge of the gold portion of the estate, where he developed some valuable gold mines.

The English company became alarmed at the increased tariff on tin and tin plate, the closing down of the Welsh tin plate manufactories, resulting in millions of dollars loss and the discharge of thousands of workers, and the Temescal ore proving to be unusually rich, they decided to suspend operation on these mines and pocket their loss rather than ruin the English tin interest. The stockholders refused to advance any more money by voluntary contribution or mortgage bonds and the stock reverted to the bondholders.

The Colonel returned to Europe and entered into negotiation with the bondholders and obtained an option on their bonds. He then left for New York and formed a new organization to develop this property by resumption of operations and rehabilitating the mines. At the date of the Colonel's death all arrangements had been perfected and work resumed, but his untimely death may retard operations.

Another Unique Ruling.

REGISTER HULL, of the Redding, Cal., Land Office, has made a ruling that will elicit a response not wholly in the affirmative. It is herewith appended without further present comment:

In view of departmental decision in the case of *Ferrill et al. vs. Hoge et al.*, 18 L. D. 81, all applicants for patent for placer mining claims embracing more than one 20-acre tract will be required to furnish evidence showing a discovery of mineral upon each 20 acres embraced in the tract.

This rule will apply not only to all applications which are filed in the future, but also to all applications for mining claims of this character which are now pending before this office or before the General Land Office.

In all future applications, where the claim is not taken by legal subdivisions, this evidence should appear in the report of U. S. Deputy Mineral Surveyor, and in the Surveyor General's certificate, and it would be well to set the same fact forth in the application for patent. Where the location conforms to the lines of the public surveys, this evidence must be shown by affidavit of the applicant, duly corroborated by the affidavits of two or more witnesses.

In all cases where the application has already been filed, and which are now pending before either this office or the General Land Office (whether taken by legal subdivisions or not), the evidence called for above may consist of the affidavits of claimant and two or more witnesses, fully and particularly setting forth the facts of the several discoveries and the location thereof.

Redding, Cal., April 21, 1894. SYLVESTER HULL, Register.

LEADVILLE, Col., the one time "carbonate camp," is now turning out \$10,000 a day in gold. And the free coinage of gold goes on.

Minneola Canal—A Wonderful Water Development.

An interesting water development is found on the Mojave river in San Bernardino county, on the line of the Atlantic and Pacific railroad near the town of Daggett.

This canal, the largest in southern California, has a carrying capacity of 25,000 inches, or 500 cubic feet per second, and for a distance of one mile from its head was dug by a floating dredger.

On the preceding page is an illustration, from a photograph, showing the dredger at work in ten feet of water. The bottom of this canal, through this mile of its length, lies through a water-bearing strata. The bottom of the canal at its head is 14 feet below the level of the water in the river, but none of the water of the canal, as shown in the illustration, comes from the river, as it seeps in through the water-bearing strata—pure coarse sand and gravel—through which the cut is made.

Except in times of high water there is very little surface flow of water in the Mojave river at the head of the canal, but the under flow of the stream is very great, filling the coarse sand and gravel for an average depth of 25 feet for a width of 1600 feet. In midsummer the surface flow of the river does not exceed 200 or 300 inches, but there is always a surface flow indicating that the underflow is always full.

The work of tapping this underflow has not been attempted yet. The plan of procedure, however, has been definitely settled. There will be a deep cut made across the river by the dredger. The bottom of this cut will be 14 feet below the surface of the water level at that point. In this trench, which will be 1600 feet long, will be laid a box flume 10 feet wide and 5 feet deep, so constructed that the water will find its way into the flume readily, while the sand will be kept out. This flume will have a grade of about eight feet to the mile, so as to carry off the water readily, and with it carry whatever sand may find its way into the flume. The bottom of this flume is on a level with the bottom of the canal which will carry away the water.

The main canal is completed now for a distance of four miles to Daggett, while a branch canal, with a capacity to convey about 5000 inches, is completed for a distance of four miles more.

The Mojave river has a fall of about 19 feet to the mile. Forty miles above the head of the Minneola canal, at the upper narrows, the river carries in midsummer 10,000 inches of water on the surface, besides a large underflow. Below the narrows a large extent of country drains into the river, including the Antelope valley and all the mountain streams which flow into the Mojave plateau west of the San Bernardino meridian; and while there are no surface streams which flow into the Mojave river from that section of country, there must be a large underflow that finds its way to the river and through this gap in the hills where the Minneola canal is taken out.

Engineers estimate the amount of water within reach of the Minneola canal all the way from 5000 to 25,000 inches.

Ten miles below the head of this canal is a drop of 100 feet in the canal, which will furnish several thousand horse power, the amount being dependent on the amount of water obtained. This power, converted into electricity, can be sent to the various stamp mills in this mining section, and power can thus be furnished at one-quarter the cost of the power now generated by coal. Mills which cannot be run to-day because of the high price of coal and low price of silver can thus be started up again and hundreds of people furnished remunerative employment where now a few do indifferently well.

There is a firm belief in electrical circles to-day that the time is not far distant when iron ore will be reduced by electricity instead of coal. There is an iron mountain within 25 miles of this water power which shows 20,000,000 tons of iron ore above the surface of the ground that yields from 60 to 70 per cent of iron. This iron is pronounced by the Union Iron Works and Eastern iron workers to be the very best quality for the manufacture of Bessemer steel. A railroad is contemplated from this water power to the iron deposit, and there appears to be little to hinder the building up of an iron center at this water power which shall work a revolution in the iron industry of this coast.

THE Governor of Idaho and the Knights of Labor of Wallace, in that State, have had a falling out, the labor organization denouncing the State executive. They asked him to dismiss the State mine inspector, being dissatisfied with his report regarding the fatal ore cave in the Bunker Hill & Sullivan mine, which request was refused. The Governor gave the matter full examination, visited the mine with whose underground workings he was familiar, and saw for himself that his subordinate's report was faithful and impartial, and, accordingly, stood by him, in which he did just right.

General Mining Notes.

THE Herqua Hela of Arizona paid a 6d per share dividend lately.

NEVADA DAY will be celebrated at the Midwinter Fair next Tuesday.

THE Rin Timo (Spain) copper mine paid its stockholders 7 per cent in 1893.

GOLD placers of considerable richness have been discovered in the interior of Lower California.

THE Rico (Aspen, Colo.) silver mine paid a 24c per share dividend on the 10th, amounting to \$25,000.

A LEADVILLE, Col., syndicate are sinking a deep shaft there to strike the supposed ore bodies that underlie the city.

THE total output of the Elkborn mine in Montana for March yielded \$38,264. The expenses were \$23,564 and this profit \$14,700.

A MINING stock exchange on which the mines in the Cripple Creek district will be listed, has been organized at Colorado Springs.

THE Hull & Beck mines on Lone creek, Josephine county, Oregon, were sold last Saturday to J. M. Sparkins of Seattle for \$20,000 cash.

ARRANGEMENTS have been made for the building of a ten-stamp mill on the Ford & Bentley ledges at Humboldt Canyon, Placer county.

BUILDING the railway from the White Cloud iron and copper mines, to connect with the Central Pacific at Wadsworth, Nev., will begin next month.

THE mines in Graniteville, Nevada county, employ about 100 men. The Sheep mine, in that district, has a vein of gold-bearing quartz two feet in width, assaying \$50 per ton.

THE Calumet & Hecla (Mich.) copper mine will pay a half-million dividend of \$5 per share next Tuesday. This will make \$40,350,000 in cash dividends this mine has paid to its stockholders.

It is claimed that more than fifty new gold placers have been discovered in Colorado since the 1st of January, and it is estimated that the gold output of the State for this year will exceed \$20,000,000.

ENCOURAGED by the success of the Quincy Mining and Water Co., seven or eight applications for licenses will be made to the Debris Commission as soon as possible by mine-owners in Plumas county.

AN important placer mining enterprise is reported on the Hassayampa, Arizona. A large amount of placer ground has been located, and will be worked on an extensive scale by an Eastern company.

THE gold output of the Witwatersrand, South Africa, district for March was 165,372 ounces, which makes the total for the three months ending March 31st 467,056 ounces, an increase of 153,956 ounces, or 49.2 per cent over the first quarter of 1893.

THE Great Northern Railway is reported to be under contract to forfeit \$17,000 per day for each day they cannot deliver ore from the mines of the Boston & Montana Company at Butte to the smelter at Great Falls. If so, the recent strike was a costly one for that company.

ARRANGEMENTS have been made to save ex-Senator Tabor's opera-house block in Denver from foreclosure under a \$275,000 mortgage, on which he has been paying interest of two per cent a month. Tabor is working like a common miner at the Jesus Maria mine, 300 miles from civilization in Mexico, and is said to be taking out between \$6000 and \$7000 a month.

COLORADO mining men have gone into the Meadow Lake country with the idea of working the ore. Twenty-five years ago Meadow Lake had a population of 12,000, and many fine residences and business houses, some of the latter still remaining, though in a dilapidated condition. During this excitement considerable effort was made, but the rebellious nature of the ore made it unprofitable to work it with any of the processes then known.

THE regular monthly sale of the Victor mine, at Cripple Creek, is reported this week, this time for \$550,000. The fact is, says the *Denver Mining Industry and Tradesman*, that in spite of all the reported sales, there have not been \$300,000 of Eastern money invested in and paid for Colorado mines since January 1st. Nearly all the money invested is by Denver and Colorado Springs men. The great majority of all sales reported are made only in imagination.

FROM Redlands, Cal., comes the statement that prospectors from the neighborhood of Death valley have displayed a large quantity of fabulously rich gold ore, assaying over \$2000 a ton; that several mining experts and capitalists have become interested and have agreed to furnish the needed capital to open the roads, build the mills, etc. They declare that a ledge is exposed for 800 feet, with an average depth of two feet, and that more than half a million dollars in ore is in sight.

WITH a grain of salt may be taken this dispatch from the City of Mexico: "A party, including competent geologists and mining engineers, began a systematic search for gold in the State of Guerrero, some months ago. The party has returned here, and a mine will soon be officially assigned to them. A report, given out confidentially among bankers, indicates an important gold discovery, equaling that of the gold fields of South Africa. The chief of the party declares that fully a thousand mines could be located in the new gold fields."

ONE of the largest nuggets in the history of mining is reported to have been hoisted out of the Smuggler mine, at Aspen, Col., a few days ago. Workmen encountered a huge body of ore, and in digging around it found that it was a monster nugget, and after considerable work got it to the surface intact. The chunk weighed 3300 pounds, and contained silver to the value of \$25,000. It is pronounced to be the largest silver nugget ever known, and, what is more peculiar, it is almost pure. This beats the record made in the Gibson a few years ago, when a nugget weighing 300 pounds was removed.

ONE of the largest freighting outfits in the world is used in connection with the mill at the Mammoth mine in Arizona. The distance from the mine to the mill is three miles, all but half a mile down grade. Three teams move 145 tons of ore a

day. Each team consists of 20 animals, and they draw four wagons. Three trips a day are made—usually without doubling—though sometimes one or two wagons are taken off at the up-hill half a mile. The wagons are immense affairs, almost as big as box-cars. The tires are from four to five inches wide and from an inch and a quarter to an inch and a half thick.

SUPERINTENDENT KLEPKO of the Boston & Montana smelter at Great Falls, Montana, makes a report showing that the total smelting for 18 months has been equivalent to 218,058 tons of ore and the production of 33,398,915 pounds of copper, as follows: Matte shipments, 4,781,440 pounds; pig copper shipments, 10,557,340 pounds; ingot and cake shipment, 7,246,834 pounds; electrolytic cathode shipments, 8,375,675 pounds; sundry small shipments not reported, 1194 pounds; on hand January 1, 1894, matte, pig copper, refined copper, anodes, solutions, etc., 2,358,714 pounds; furnace refinery loss in refining, 10,825,558 pounds; ingot and anodes, 77,718 pounds; total, 33,398,915 pounds. The capacity of the electrolytic refinery has been gradually worked up in capacity until it is now producing monthly 1,600,000 pounds.

General News Notes.

CHICAGO claims 1,575,000 population.

THE Midwinter Fair is a financial success.

GERMANY refuses to withdraw from Samoa.

UP to date there have been 1,300,000 admissions to the Midwinter Fair.

THE Government has at last decided there shall be no more Indian soldiers.

A FIRE at Nainaimo, B. C., last Sunday destroyed property valued at \$100,000.

THE Hawaiian royalists have hopes of overturning this Provisional Government.

PAESANT CLAVELAND says the newspapers are to blame for the Coxey movement.

THE Prince of Wales expects his son to see the inauguration of a British republic.

KING LEOPOLD of Belgium opened the World's Exhibition at Antwerp last Saturday.

THE gold-coinage circulation in this city is \$2,884,894 less than on January 1, 1894.

THERE has been a general compliance with the Chinese registry law in all parts of the country.

ALL business is paralyzed in the Argentine Republic, and a revolution is considered imminent.

SEVERAL Chicago millionaires have declared for bimetalism, and will work for the coinage of silver.

WEEK has been resumed on the Esmeralda mine, in Calaveras county, owned by John F. Davis of Jackson.

THE Baca, Arizona, grant, containing 100,000 acres, was recently sold for taxes. The amount due was \$1200.

THE amount required for pensions to United States soldiers and their heirs for the month of April was \$12,700,000.

GAULFE fears are felt in London regarding East Indian affairs; the British Government apprehends a probable mutiny.

THE St. Petersburg police have discovered a vast Nihilist conspiracy. One hundred people have already been arrested.

CONGRESSMAN CAMINETTI has introduced a bill to divide northern and central California into two judicial districts.

THE large banks of Europe are increasing their gold holdings, which are now up to about the highest point ever reached.

DESIRING to be in time, Gen. Harrison announces his candidacy for the Republican presidential nomination in 1896.

It is now thought that the Wilson tariff bill will shortly pass the Senate. Even Hill of New York is expected to vote for it.

THE San Francisco Woman's Congress has adjourned. 'Twas resolved that soap, soap and salvation were the three great requisites.

THE New York bank surplus, which is \$82,000,000 now, was \$15,000,000 a year ago, \$19,000,000 two years ago, and \$6,000,000 three years ago.

"DICK" McDONALD, the mismanager of the wrecked People's Home Savings Bank in this city, has been indicted by the grand jury and jailed.

UNEMPLOYED workmen are holding meetings throughout England demanding employment and that eight hours shall constitute a legal day's work.

THE London *Chronicle* thinks that the Coxey armies foreshadow a contest in this country "that will be almost as serious as that which arose from slavery."

AT the Cordite Powder Works near London, last Monday several thousand jars of nitrate and sulphuric acid exploded. Four persons were killed and thirty injured.

THE Secretary of the Interior has issued an order in relation to the Sierra forest reserve. All grazing of horses, sheep or cattle is forbidden, as is all cutting of timber.

THE report of the directors of the Union Pacific shows a deficit for the year on the whole system of \$2,595,841, compared with a surplus the previous year of \$2,006,767.

KALLY and his "industrials" have built a navy at Des Moines, Iowa, to go down the Des Moines to the Mississippi, thence up the Ohio and on to Washington via Harper's Ferry.

BAET HAATZ recently told an English friend that he is afraid to revisit California, as he does not wish to obliterate from his mind the California of the days when San Francisco was young.

THE treasury of Texas is without a dollar. Before the end of the year there will be a deficiency, and it is doubtful if the State will be able to meet the interest on its bonds, amounting to \$4,000,000.

AN official notice has been issued in Italy saying that, owing to the economic crisis in the United States, numbers of willing workmen have been rendered idle, and everywhere Italians have to struggle for work against American workmen. The

notice therefore warns Italians not to think for the present of emigrating to America, and especially warns such of them as go to that country to avoid Maryland, Delaware and Pennsylvania.

WILLIAM WHEALEN, of St. Peters mine fame, convicted of obtaining \$3,000,000 by floating stock absolutely valueless, was sentenced in St. Louis last Saturday to four years in the State Prison.

THE World's Fair buildings have been offered for sale at the following prices: Manufactures, \$23,350; Machinery Hall, \$12,650; Horticulture, \$7500; Agricultural, \$5000; Mines, \$4000; Fisheries, \$1500.

THE Senate Committee has reported in favor of building 12 new torpedo-boats, at a cost of not to exceed \$200,000 each, with a speed of not less than 25 knots an hour, four of them to be built on the Pacific coast.

ON the Chicago, Burlington and Quincy Company Railway, at Anrore, Ill., several locomotives are being provided with apparatus for burning oil. In a short time every engine belonging to the company will be so equipped.

THE Bear Lake Consolidated Mining Company has incorporated to develop the Snowshoe claim in the Slovan district of West Kootenay. The capital stock is placed at \$500,000 in \$5 shares, and the business headquarters are at Victorias.

AL, AR, BSC, BAR, BET, BOB, BUD, CAP, EYS, FI, FLY, GAS, GAG, GUY, HAM, INK, JOE, MAN, NAT, RST, SAC, SIM, SIP, WEX, WITT, YELL, ZIFF! No, these are not college yellies; they are names of some of the postoffices in the United States.

It is stated in Paris that the several million francs which Dr. Cornelius Herz, M. Eiffel and the trustees of the estate of Baron Reinach agree to pay to the liquidators of the Panama Canal Company will be used toward the completion of the canal.

THE new Kansas ballot law requires that "the lower limbs of the voter as high up as the knees shall be visible from the outside while the voter is in the booth preparing his ticket, the lower part of the booth having been left open for that purpose."

A boom in Russian manufacturing in general is reported. Factories, especially of machinery and railway supplies, are said to have orders for four or five years ahead, and to be working extra time. This is largely ascribed to the opening of markets in Asia.

THE Treasury Department has made a demand on the North American Commercial Company, which has the contract for the exclusive right of taking fur seals upon the Pribyloff islands in Alaska, for about \$250,000, and the matter is being argued before Secretary Carlisle and Assistant Secretary Hamlin.

CAPTAIN J. A. MELLON will next Thursday leave The Needles in the steamer Mojave, bound through the Black canyon and Devil's gats to Riverville. It has been exceedingly rare that any kind of a boat could get up farther than the mouth of the Virgin, but Captain Mellon is going to try to climb the cascades during the high water. He will have to do it with ropes and capstans.

It is stated that the mean average wages paid in the entire country in all manufacturing industries except mining and quarrying, for 1890, was \$484 per head. Among the States falling below this average were these: Alabama, \$410; Georgia, \$177; South Carolina, \$217; Maine, \$134; New Hampshire, \$101; Wisconsin, \$92. Among the States exceeding this average were Colorado, \$236; Montana, \$238; Massachusetts, \$10; New York, \$65; Pennsylvania, \$8; Wyoming, \$284.

THE Connellsville (Pa.) coal-miners' strike has been led by ladies. "Hell hath no fury like a woman scorned," and some of the women who have led in last week's scenes of violence appear to have been "scorned" somewhere, for they acted like demons, attacking the deputies and peace officers with axes. Americans are getting very weary of the murderous pranks of those savages foreigners who have no more idea of our institutions than a San Francisco policeman has of the whereabouts of a gambling game.

Personals.

J. B. HASTINGS has returned to Boise, Idaho, from Nevada.

GEO. D. ROBERTS has been appointed superintendent, and T. J. Benny, foreman, of the Mt. Moriah mine, Sierra county.

HANK SMITH, well known in years gone by on the Comstock, is now superintendent of the Grizzly mine, at Ruby Hill, Nevada.

G. E. SEABENT, superintendent of the Brown Bear mine at Deswood, died suddenly at the Grand Hotel in this city last Monday.

THE late Geo. B. Bayley, who was killed in his elevator on Davis street in this city, had insurance on his life aggregating \$165,000.

COL. E. N. ROBINSON, the well-known mining operator, died of pneumonia in London on the 28th ult. His family reside in Los Angeles.

PAT KAASIN, recently superintendent of the Gould & Curry mine at Virginia City, has been appointed superintendent of the Allison Ranch mine at Grass Valley.

CAPTAIN S. F. SCOTT goes to London in an attempt to get money to put a hydraulic plant in the square mile of placer ground he recently took up on the Similkameen, B. C.

R. D. CLARK is in the city and will shortly leave for Sonora, Mexico, where he takes charge of the lead and silver smelter of an English company. He was formerly superintendent of the Cortez mine in Eureka county, and when that closed he became superintendent of the Eureka Reduction Works.

SI RYAN, now of El Paso, Texas, is in the city. Time was when he led on Pine street, a day's transactions often involving over \$100,000. He has made considerable money in Mexico, is prominent in Texas politics, etc., and goes to England to negotiate some New Mexico mining property in which he is interested.

F. N. SPEAR, representing the Griffin Roller Mill, of Boston, Mass., is in the city, and goes to Keystone, Amador county, tomorrow to place a mill at that point. A mill is running successfully at Escondido, and three at Colton, San Bernardino county. Upon his return Mr. Spear will establish an office in the Crocker building as resident agent.

Inclines vs. Vertical Shafts.

The notes in the Mining and Metallurgy Department of the *Engineering Magazine*, says that journal, on incline *versus* vertical shafts have elicited considerable correspondence on the question. Among others, Mr. W. D. Brunton, general manager of the Della S. Consolidated silver mines and Cowenhoven tunnel at Aspen, writes that the solution of the problem in the case of that property has been extremely satisfactory. He gives the following account of the method pursued:

Two years ago the writer was brought face to face with the problem of shaft *versus* incline in a mine where the conditions were more than ordinarily complicated. Work had to be commenced upon an ore body pitching at an angle of 56° from the horizontal, which had been intersected by the Cowenhoven tunnel nearly three-quarters of a mile from its mouth and 1000 feet vertically below the surface. It was out of the question to drift through the ore body into the hanging wall so as to intersect the vein with a vertical shaft at any reasonable depth, as the shales which overlaid the ore had an unfortunate habit of "creeping" in and crushing timbers faster than any company could afford to renew them. Directly underneath the ore body, and separated from it by about 80 feet of dolomite, was an open, porous stratum of silicious dolomite threaded with a network of watercourses. If a vertical shaft were sunk from the point where the ore body was intersected by the tunnel, it would pass directly through this water-bearing stratum, which would also be intersected by every crosscut from the shaft to the ore bodies on their continuation below.

Inclines, as every miner knows, are unhandy, expensive and dangerous, and an existing 750-foot incline on the same property had proved itself such an unfeeling source of worry to the manager and expense to the company that the prospect of a second incline was as much dreaded as a flooded shaft. One day, while I was studying the question, the following idea suggested itself: "If a shaft, after having been properly sunk and timbered, should be thrown out of the perpendicular by some movement of the earth's crust, would it cease to be a shaft because it was no longer plumb, and if it was tilted over on its end instead of its side would there be any reason why the cars could not be run directly from the cages into the drifts without interfering in any way with the pump compartment or manway?" Never was an idea more eagerly welcomed or acted upon with greater good will by all concerned. The miners who began work on the shaft, especially the old-timers, who are naturally conservative, looked with some suspicion upon this plan, but before a week had elapsed they arrived at the unanimous conclusion that an inclined shaft was easier to sink, safer to work in and more convenient to operate than a vertical shaft, and that the old-fashioned incline should hereafter be considered a thing of the past.

This inclined shaft has now been sunk to a depth of 250 feet in the face of a very heavy flux of water, to extremely difficult ground, and so far without a single accident. At 84-foot intervals levels are run out from the shaft each way, down to which the tunnel cars are lowered on a cage, beneath which is attached a light steel self-dumping skip for the use of the men who are sinking, and the operations of drifting, mining and sinking go on simultaneously without in the least interfering with each other.

The incline spoken of is two-compartment and has its longer axis of cross section at right angles to the dip instead of parallel with it, as more usual. The pump compartment is above the hoisting compartment. It is locally called an "inclined shaft" rather than an "inclined winze," because, as Mr. Brunton explains, "ordinarily we speak of a winze as an underground connection between two levels; but the main opening from which these levels are driven should be designated as a shaft or incline, no matter whether it terminates on the surface or at a station a thousand feet below." The hoisting machinery is situated in a large station cut out of the solid rock on the level of the Cowenhoven tunnel. There is no intention of connecting this incline shaft with the surface, as there could be no possible gain by such a proceeding. The machinery is at present operated by compressed air, but an entire electrical equipment, including hoist, pump winch and pumps has already been ordered. The "cage" runs on wheels, but is altogether different from the Comstock giraffe.

The Phonopore System.

A company has been started in England for the purpose of introducing the phonopore system, whereby the carrying capacity of existing telegraph wires can be doubled. To meet the requirements of several of the railroad companies it has taken up the question of working a single instrument by the phonopore method. This has been successfully accomplished; and, as nearly all the telegraphists read by the sound from the needle, they will be able to use to great ad-

vantage a new sounder, worked by a handle, similar to a single-needle instrument, by which an entire circuit can be duplicated. This instrument (or a phonopore telephone for speaking, with a special bell call on the same wire,) can also be attached to the block, bell or train staff wires, without any interference with their working. If the needle instrument is preferred to this new sounder, it can be applied to existing wires, but two wires will be required. A mixed current can be formed of the two systems, sounders and needles. Phonopore telephones can be attached to ordinary telegraph and block wires, and conversation can be carried on distinctly in spite of any ordinary induction. On several occasions, when a wire has broken or became defective and the ordinary telegraph in consequence become unworkable, it is stated that the phonopore telegraph remained undisturbed, and continued to work satisfactorily although on the defective wire.

Digging Gold with a Steamer.

Extravagant stories are told about the wealth of gold sprinkled through the Snake River country in Idaho. As a general thing the gold is very fine, the particles being of so light weight as to be elusive. Save when worked on a large scale it is difficult to make good wages in recovering the gold. Numerous bars along the river would prove profitable could water be commanded for sluicing or hydraulicking. An adequate supply is hard to obtain, from the slight gradual fall of the stream and level character of the outlying lands. To overcome this lack of water, as well as to insure sufficient dumping ground, a big floating gold-saving dredge has been constructed and is now at work on the Idaho bank of the river, about ten miles above the Payette. It is a stern-wheel flatboat, propelled by steam. Substantially constructed, 65 feet long and 22 feet wide, it is equipped with a 35-horse power machine engine and boiler, and adapted in every way for navigating Idaho's great waterway. With a slight alteration, it could be transformed into a steam dredge and used to scoop up sand and gravel from the bottom of the stream. As in the past, operations are now confined to working bars out of the channel of the river.

The method pursued is to anchor alongside one of these gravel deposits, and, by the use of scrapers, bring the material to be handled within reach of the gold-washing machinery with which the craft is rigged. The gravel is scooped up by buckets attached to an endless chain. There are 48 of these receptacles on a belt 60 feet in length, and each has a capacity of about 20 pounds of dirt, which is delivered into a hopper. This is also an agitator, and the process employed may be described as a steam rocker, with the exception that it has an end motion instead of one sidewise. The gold is caught on copper plates with quicksilver. The tailings are carried off in sluice boxes by a stream of water of 150 mineral inches, supplied by a China pump run by the engine which drives all the other machinery. The gravel is worked so thoroughly that no gold escapes in the tailings that are dumped into the river. An average of 100 tons of gravel are handled, and for this work three men are employed—an engineer, one to work the scraper and another one who shovels the dirt into a pile so that the buckets can scoop up a full load. The bar now being worked covers an area of 10 to 15 acres. The gold is on top or close to the surface, and will not pay to huddle to a greater depth than 12 to 18 inches. This shows a value of 1½ to 3 cents a pan. A cleanup is made every night, and the average of the runs for the first three days was very satisfactory to Thornton Williams, the owner of the craft. He says he expects to take out upward of \$100 a day as long as he works.—*Helena Independent*.

Book Notices.

THE STATISTICIAN AND ECONOMIST FOR 1894.—The popular edition of this very useful book is received. It is compiled by L. P. McCarty and is up to date, which, probably, is praise enough to any one acquainted with Mr. McCarty's thoroughness and accuracy. The price of the book is fifty cents, and it is worth one hundred times that to any one who would keep posted on the practical and progressive in life.

MINE VENTILATION MADE EASY.—This is the taking title of a little volume which, in concise shape, gives what the majority of readers want to know on that subject. It gives rules, laws and experience, and detailed answers to 155 questions. It is published by the Colliery Engineer Co., Scranton, Pa., to whom all orders should be addressed.

THE POLITICAL ECONOMY OF NATURAL LAW.—This is the title to a timely book by Henry Wood, and tends to dispel much of the mawkish notions so prevalent regarding duty and the rights of the individual. It shows in clear, cogent reasoning that natural law governs all things mundane, and that to attain satisfactory results we must act in harmony with this natural law. It discusses labor, capital, competition, co-operation, supply and demand, socialism, corporations, industrial education, and intelligently deals with the problems of the hour. It is deserving of a place in the library of every thoughtful man, and if widely read would act as an antidote to many mistaken conceptions of rights and wrongs. The book will be sent by mail by Lee & Shepard, Boston, on receipt of \$1.25.

La Plata Gold Fields.

TO THE EDITOR:—This extensive gold belt is situated in southwestern Colorado, on the Pacific slope of the Continental divide at the south end of the San Juan range, in La Plata county, and 20 miles northwest of the city of Durango, Colorado, on the Denver & Rio Grande railroad. This gold belt extends 20 miles east and west, and 12 miles north and south. The altitude varies from 9000 to 13,150 feet above sea level. The formation is both eruptive and sedimentary and all metamorphic. The ores are strictly gold-bearing and found in fissure, contact and blanket veins. The vertical fissures vary in size from a foot to 20 feet in width and show great permanency in length, also depth so far as limited development goes. As a rule, these ores are refractory and carry a large per cent of their value in tellurides. Cyanide treatment, however, saves 90 to 95 per cent of assay value.

The contact veins carry a good average width of from 3 to 30 feet. Much of this ore is free milling on surface and will run from \$3 to \$30 per ton. It is safe to say that four-fifths of the veins and ore are refractory and carry an average value of \$10 per ton, and the average width of ore will not fall short of four feet. The blanket contact vein or deposit lately discovered, and known as the "Baker contact," reefs the mountain at an altitude of about 10,000 feet, and extends a distance of 15 miles east and west, with a slight dip to the north and into the mountain. The thickness of this immense mineralized reef or blanket deposit is from 100 to 300 feet. That portion carrying the heaviest pay is a decomposed porphyry, oxidized iron and rotten quartz. The value of this ore is not yet determined, but is said to be about \$3 per ton, and also claimed to be strictly free milling. Senator Jones of Nevada, with California associates, have taken a lease and bond on a large tract of this mineral wonder, and promise to prospect the same with a test mill of ten stamps at once. There are fully 500 lode locations made on mineral outcrop in this new camp, and yet two-thirds of the district is not prospected or staked. Fully ten prospects have shipped ton lots for tests to the Durango smelters and sampler, showing returns of from \$50 to \$500 in gold. The proposition, however, resolves itself into a low-grade treatment of large bodies of pyritic and telluride ores carrying a value of from \$10 to \$15 per ton; cheap fuel and abundance of water at hand. Thus far no mills are on the ground except a test cyanide mill of ten tons capacity, which treats the tellurides cheaply and successfully. The values being largely in the iron in the pyritic ores, require a special treatment. The rich placer bars along La Plata river a distance of ten miles proves that the origin of free gold is not found unless it be in the Baker contact. ADNA LAMSON.

DURANGO, Colo., April 26, 1894.

The Geographical Society of the Pacific.

The conference of the Geographical Society of the Pacific was held on the 4th inst. in Festival Hall, within the Exposition grounds. President Davidson delivered the introductory address, stating the objects of the congress. He was followed by Wm. Emmette Coleman of the American Oriental Society, New York. M. Borel having requested to be excused on account of illness, Capt. Everill was the next speaker, on New Guinea. The president read Capt. M. A. Healy's paper, a most interesting document. Prof. Greene, of the University of California, took the platform for half an hour, upon the flora of the coast, remarking that the field was very wide, and that much work yet remained to be done in it by the botanist. The professor stands eminent as an authority in this department. Hugh Craig, Benj. C. Wright and Theodore H. Hiltell followed in the order named.

Owing to the lateness of the hour, it was then decided to read the remaining papers at special meetings of the society, and the conference closed.

Mr. Robert Cox, a delegate from the Royal Scottish Society of Edinburgh, telegraphed from Los Angeles his regret that he was unable to reach San Francisco in time for the meeting.

The papers were all original, and all showed extended and minute examination of the subjects.

So many requests have been received by the secretary from Eastern and foreign scientists for a report of the conference that the society will probably publish a special bulletin, with all the papers, including those of Prof. Davidson, Gen. Darling, Jas. E. McGrath, Th. E. Slevin, E. J. Molera, J. McI. Wood, Capt. Chas. L. Hooper, U. S. Rev. Marine and Lieut. George Stoney, U. S. N.

The congress is another evidence that California takes her part in aiding the advance and development of education and science.

THERE is a further drop in the price of incandescent electric lamps, a Boston company now offering 16-candle power lamps for 25 cents.

Lively Times at Angel's Camp.

TO THE EDITOR:—Long before the hotly contested fight to preserve the prestige of silver had ended in failure, the mining press of the country and far-seeing mining operators predicted that the first effect of demonetizing the white metal would be to give new life to gold mining. It was quickly perceived that the withdrawal of the capital employed in silver mining must in the aggregate amount to an enormous sum, and that, in accordance with natural laws, it would seek some cognate channel where past experience and methods would be most likely to be available.

The prediction has received a most complete verification, and new vigor has already been imparted to every gold camp in the country. It is now certain, from returns received by the Director of the Mint for the first quarter of the year, that 1894 will see the largest production of gold for many years past.

In the general improvement California is getting her full share already, and by reason of the great natural advantages offered must soon be at the front of the column of progress. The present movement is gradually gaining an enormous impetus that will speedily carry the fame of her great gold belt once more to the uttermost corners of the earth. It is a singular fact, and one that has kept back the growth of gold mining in this State, that the newer the country and the less known about it the greater the attention given to it. California has been known as a gold country for so many years that it has long since ceased to cause any particular interest or comment, and the impression prevails everywhere that it is largely worked out. This is not only true outside of the State, but is largely the case—except among the best informed—at home. The world at large knows only the general fact that hundreds of millions of dollars of the shining metal have been produced from her mines, but does not know that nearly all of these millions came from the placers and surface diggings, the product merely of that superficial erosion caused by the infinitely slow processes of the elements, but which have barely touched the original sources and storehouses of the vast treasures remaining. While the aggregate product from widespread sections has been enormous, it is but a fraction of the wealth remaining in the quartz-ribbed vaults of the eternal Sierras.

But, after all, the fact remains that newer countries with far less mineral resources and but few, if any, of the great natural advantages with which California is favored, have attracted the gold-seekers, while her countless lodes of immense extent and richness have lain idle and neglected, the comparatively few quartz mines of the State not really constituting a beginning when compared to the immense possibilities. It is the velocity given by the first great "rush" or "stampede" that advertises a new mining district or country and attracts the men and money that finally build it up. California had one inning in this line and startled and fascinated the world, but the maximum development was along the lines of placer and hydraulic work, which the hostile agitation of the anti-debris people and the subsequent legislation practically paralyzed at the very summit of success. But, unless all indications are deceptive, another development, still greater and more lasting, is impending which, when it reaches flood tide, will again attract world-wide attention and once more fill the mining districts with eager life and activity, though it must be rather a slower process than when the California gold fields added the charm of novelty to unrivalled richness.

Though the mixer of the Golden State has carried placer and hydraulic mining to the top notch of scientific success, and become the standard of the world in that branch, yet, in accordance probably with the great law of compensation, he is an infant in quartz work, and the miners of Colorado and Montana would be inclined to smile at many of his methods and ideas. But in this, as in all things, there are exceptions, and these seem particularly brilliant in California because of the dead level of general inefficiency that surrounds them. Among the few who constitute these exceptions, and whose natural ability, sound judgment and great foresight have led them to systematic and scientific work, resulting in great financial success, is Alvinza Hayward, who has stuck to California gold properties and patiently developed their capacities and peculiarities while many of his contemporaries were scattering their investments from Mexico to Alaska and into all the mining States of the Union.

About six years ago Mr. Hayward bought a controlling interest in the Utica mine, at Angels, which had been a perfect graveyard for mining capital, though a rich streak at one time is said to have enabled James G. Fair to unload it for the "stake" that afterward grew to such round proportions in other mining ventures. Mr. Hayward's theory has always been that mining on the mother lode, to become permanently profitable, must be carried on in depth, so that he immediately commenced sinking on the

Utica; and at 800 feet was rewarded with a rich body of ore of immense size and which has gone on steadily widening and increasing in value until to-day the mine is conceded to be the richest on the coast, and probably in the world. That was the beginning. It may be said to have been the origin of successful quartz mining in Calaveras. "Nothing succeeds like success," and of course others were soon profiting by good example, while Mr. Hayward and his associates were also spreading out and covering in more ground. So, year by year, this company and the others that have followed in the lead have been quietly working away, turning out monthly dividends with a certainty and regularity that have gladdened stockholders' hearts and astonished all investigators, until now the district is on the eve of an inevitable and well-founded boom. It is needless to say that the owners of these mines have done nothing to attract attention to the country. They are well satisfied to keep quiet and gradually acquire, at low prices, all the mining land possible; but things have gone too far for that condition of affairs to exist any longer, for too many people have taken in the situation to keep the news from spreading.

ANGEL'S CAMP.

The center of all this activity and prosperity is Angels, or Angel's Camp as the old timers still prefer to call it. The Utica and several other of the best mines are located right in the town and of course the place has kept pace with the growth of the mining interests. It is unquestionably the liveliest and most thriving town on the Pacific coast and probably in the United States. It is a most cheerful place to visit in these days of dullness and universal depression. The streets are crowded always, but especially of evenings, when the miners quit work and everybody flocks in from the surrounding country, when the jam would hold its own very well with lower Market street when the Midwinter Fair crowds focus at the ferris. Not a vacant storeroom or office can be had for love or money. Everybody is busy and contented, and the whole place wears an air of conscious thrift and success.

The muffled boom of blasting comes in from the hills and gulches on every side, while the roar of stamp mills is heard in all directions. Bustle and life abound; saloons are thick and crowded, hotels overrun until it is often impossible to get a room, and all the other symptoms are in plain evidence that indicate the fever that culminates in a "boom." Already the mining operators, always the first to scent a mining development from afar, are on the ground and more coming every day. There is another feature about the place that arrests the attention of a stranger as quickly as the great activity of its people, and that is its tremendous population of dogs. It is something wholly unique and appalling, for a very superficial calculation shows that it must take as much food again to supply this howling, tearing, fighting, parti-colored mob as for the balance of the inhabitants, and as all supplies have to be hauled from the railroad, 20 miles away, it must be rather an expensive item of expenditure. It is not known if there is any local rule or custom that requires every man, woman and child to own at least one dog, but the facts seem to point that way.

The Utica and the other mines being worked by the same company—the Stickles, Gold Cliff and Talloc—are now employing about 700 men, their pay roll for last month being in the neighborhood of \$65,000. This alone would support a good-sized town, but there are many other mines and mills in constant operation which contribute to the growth of the place. The population is now stated to be over 3000, though the latest California gazetteer, published barely a year ago, credits it with only 700. In addition to the mines already mentioned, with a milling capacity of 200 stamps, there are the Blair mine, ten stamps; the Oshorn, ten stamps; the Maltman, five stamps; the Calaveras, twenty stamps, and the Jones and Porter, forty stamps, all running day and night and paying regular dividends.

Prospecting is going on with a vigor unknown since the great placer days, and new strikes are reported every day, most of this work being done, however, in the old locations. Four of these old claims, lying together and recently relocated by A. O. Viertong, have just been sold to Dr. Burd of San Francisco and his associates, and they have announced the immediate construction of a hundred-stamp mill and the commencement of operations on a large scale. The Calaveras Company, a rich English corporation, which has been prospecting their property extensively with a 20-stamp mill, have just made public their intention of adding 80 more stamps to their plant at once and the beginning of regular mining with a large force of men. The Hayward Company talk of adding 60 more stamps to the Talloc mill, making it 100, as they have now prospected the mine to a depth of 1000 feet, and it is claimed that it is to be a far greater property than even the old Utica.

These great improvements, together with the usual

rumors and vague whispers of rich strikes and proposed developments, always so plentiful in an active mining town, keep every one on the *qui vive* of excitement—the bread of life to the miner and a stimulating tonic that energizes the whole community.

The future is certainly very promising for this hustling little city, for its present prosperity seems merely the beginning. An old and widely experienced mining man, who has recently gone over the country very thoroughly, claims that "the country is practically a virgin gold field, almost wholly untouched," and it is assuredly true that the mining industry is barely in its infancy. With the few notable exceptions mentioned, the entire region is practically unprospected. With the great mother lode crossing the full width of the county, and everywhere visible in enormous croppings, and a network of lodes, veins and stringers in every direction, yet there has been almost no work done upon them, and it is probable that not one-fourth of the veins have been discovered, let alone explored.

But the great and ever-increasing success of the mines already opened is having a wonderful effect upon the old inhabitants as well as the fresh arrivals, and old shafts and tunnels, many of them started in the days of '49 and early '50s, are being cleaned out, retimbered and put into shape for working, while here and there a real prospector is stumbled upon patiently searching for new locations, though as yet this class is very scarce. Enough, however, is being done in new directions to insure an immense increase in active operations during the coming summer, and the great expansion of the mining business here will undoubtedly prove a starting point for a rapid and prosperous growth throughout the entire gold mining section of California, without question the greatest in the world, not even excepting the much lauded and so-called "Golden South Africa."

EUGENE B. CUSHING

Angels, May 9, 1894.

Carbonate of Zinc Deposit.

TO THE EDITOR:—In your issue of March 24th you describe the process of Dr. D. L. Bartlett for treating zinc-lead ores, and thinking that it might be of some importance to the mining interest of our country I give you the following facts:

There is a very large deposit of carbonate of zinc, carrying a small per cent of lead (not to exceed 3 per cent) and from 35 to 50 ounces of silver per ton, situated about 15 miles from the railroad, with a good wagon road to the mine, and which is at present not held by any one, but is subject to location in the aragona.

Something over a year ago I was sent to make an examination of the property and did so, with a view of getting capital to establish works at San Francisco to make the deposit available, but the hard times coming on, the business was allowed to go by default. The deposit is extensive and conveniently situated for working; it rises above the road many hundred feet and shows hundreds of tons that can be extracted by simply breaking it down, the ledge in places being 40 to 60 feet wide.

Samples were taken to San Francisco and examined and assayed by Prof. Hanks, which gave 27½ per cent of zinc.

Here is a field for the profitable investment of capital, as a plant to utilize the product of the mine would not cost to exceed \$5000 that would handle 25 tons per day.

The ore exists as a carbonate and the process for treating it would consist of a few retorts placed one above the other with a connection between them, so that the charge from the upper retort could be drawn to the one below after the carbonic acid had been expelled. The rationale of the process consists in first driving off the gases at a lower heat and then subjecting the ore to a heat sufficient to volatilize the zinc. By this mode we get a valuable pigment for paint, quite as good as that made from the metal, and at a cost so trifling that it would have a big profit.

A summary about as follows would be taken as a safe one:

Cost of transportation from mine to San Francisco, including hauling, mining and railroad charges.	\$15.00
Coal, as fuel.	1.00
Iron, as a flux.	1.00
Labor.	2.00
Interest and incidentals.	1.00
	\$20.00

PRODUCT—	
Oxide of zinc, 700 lbs. at 4c.	\$28.00
35 ozs. silver (taking the lowest assay value and market price) at 60c.	21.00
	\$49.00

Profit per ton.	\$29.00
25 tons per day at \$29.00 per ton.	\$725.00

I have not deducted anything for smelting the metal that comes from the ore in the retort, but as that only represents 100 lbs. out of every ton it only amounts to about \$1 per ton of ore handled, and the margin of profit is great enough to deduct it several times over.

I have only taken the metallic basis as the amount of

oxide of zinc, and yet there is an increase in their weight by oxidation, so that my item of expense is ample to cover it all. The manufacture of oxide of zinc on the coast would be a paylog enterprise even if manufactured from the metal, but a large saving can be effected by the use of the ore above referred to, while the silver would leave a profit over all expenses.

I took much interest in this enterprise and spent valuable time to get at the facts, but the capital could not be had at the time and the matter was left for future developments. If it will interest any one of sufficient capital to start works to reduce the ore and produce the pigment, I will be pleased to give them all the information I can and aid in every way to get so important an industry established without any consideration or remuneration whatever. The oxide of zinc will find a ready sale all over the coast from Washington to Mexico as a pigment for paint, as it is largely consumed by all paint grinders.

So many are seeking gold mines, and are quite willing to invest even large amounts, that I am at a loss to understand why such a proposition as this will not be taken up, as it is entirely without risk and sure to make more money than most of the mines now being worked.

I have not gone into the reactions that take place in this treatment, but will give the chemical changes that occur to any one desiring to look into the matter.

JOHN T. DAVIS.

Isujoba, Sonora, Mexico, April 21, 1894.

The Limitations of the Gold Stamp Mill

IN THREE PARTS—PART II.

Continued discussion of the paper of Mr. T. A. Rickard, read at the Chicago meeting of the American Institute of Mining Engineers, August, 1893.

On the use of double-discharge mortars much has been said; but, in spite of frequent recommendation, they have gone out of favor. The main point to be considered in this connection is, that the use of a back-discharge weakens the force of the issue through the front screen, and so gives results less than would be, at first glance, expected. There is another objection, especially in dry regions, to the double-discharge, namely, the consumption of water is considerably greater. This in itself proves the smaller force of the splash. At Clunes (Victoria), in the use of double-discharge mortars, the consumption of water is from 8 to 10 gallons per stamp per minute, while at Ballarat, an adjoining mining district, with ordinary single-discharge mortars, it is usually at the rate of 5 gallons. The crushing capacity is 2½ tons per stamp in the former, and 2 tons in the latter case.

The minimum loss of quicksilver, which has come under my notice, was at the South Clunes United Mill at Clunes, where it was 5½ grains per ton of ore. The maximum was that of the Caledonia Mill at the Thames, New Zealand, where one ton of quicksilver was consumed in two weeks by 20 stamps.

Table III indicates the loss at a number of localities.

In addition to the figures of cost of milling given by Mr. Olcott, I may contribute the data contained in table IV.

TABLE III.—CONSUMPTION OF QUICKSILVER.

DISTRICT	Loss per ton of Ore.			Remarks.
	Minimum.	Maximum.	Usual.	
Gilpin county, Colorado.....	3.7 dwts.	9.8 dwts.	5 dwts.	.....Inside and outside plates
The Thames, New Zealand.....	12 dwts.	25 dwts.	14½ dwts.	.....Outside plates. Grinding in pans
Clunes, Victoria.....	5½ grains	5½ grains	5½ grains	No plate amalgamation. Wells and barrel
Otago, New Zealand.....	5 dwts.	8½ dwts.	7 dwts.	.....Outside plate amalgamation
Ballarat, Victoria.....	2½ dwts.	5½ dwts.	5½ dwts.	.....Outside plates and wells
The Ovens, Victoria.....	4 dwts.	19 dwts.	9 dwts.	.....Outside plates. Grinding in pans
Bendigo, Victoria.....	6½ dwts.	9½ dwts.	7 dwts.	.....Outside plates and wells
Charters Towers, Queensland.....	60 dwts.	100 dwts.	80 dwts.	Outside plates. Grinding in series of pans
Amador, California.....	2½ dwts.	6½ dwts.	4½ dwts.	.....Inside and outside plates
Grass Valley, California.....	11 dwts.	15 dwts.	12 dwts.	.....Inside and outside plates

TABLE IV.—COST OF MILLING.

MILL.	Power.	Stamps.	Cost.	Year.
Hidden Treasure, Gilpin, Colorado.....	Steam, and water which is free of cost	75	\$0.78	1891
Gover, Amador, California.....	Water which is bought.....	20	0.53	1893
North Star, Grass Valley, California.....	Water, bought.....	40	0.81	1838-90
Wildman, Amador, California.....	Water, bought.....	30	0.47	1891
Britannia, Ballarat, Victoria.....	Steam.....	40	0.56	1891
South Clunes United, Clunes, Victoria.....	Steam.....	50	0.64	1890
New Chum Con., Bendigo, Victoria.....	Steam.....	30	0.68	1891
Excelsior, Charters Towers, Queensland.....	Steam.....	50	1.95	1890
Saxon, Thames, New Zealand.....	Water, bought.....	33	0.88	1892
Mountain, Thames, New Zealand.....	Water, bought.....	40	0.90	1892
Phoenix, Otago, New Zealand.....	Water, free.....	30	0.70	1890
Morgan, South Wales, Great Britain.....	Water, free.....	40	0.20	1891
Phoenix, Wynad, India.....	Water, free.....	20	0.84	1884
Mysore, Kolar, India.....	Steam.....	90	3.05	1892
May Con., Johannesburg, South Africa.....	Steam.....	20	3.15	1890
Jumpers, Johannesburg, South Africa.....	Steam.....	100	2.40	1890
El Gallo, Caratal, Venezuela.....	Steam.....	60	1.08	1891
Treadwell, Douglass Island, Alaska.....	Water, free.....	240	0.85	1893

In each of the cases contained in this table the cost of transportation is omitted. The cost of water power in California is usually about 20 cents per miner's inch (or 1.57 cubic feet per minute). At the Gover mill this expense amounts to from 18 to 20 cents per ton of ore, while at the North Star it is 31 cents, so that, including the cost

of power, the milling was done at these two thoroughly representative plants at the rate of 33 and 50 cents per ton respectively. The ore crushed at the North Star is particularly hard. The use of grinding and amalgamating pans increases the cost at the mills of Charters Towers (Queensland) and the Thames (New Zealand). At the Phoenix (N. Z.) no plates, but blankets only, are employed.

The question of the turning of the stamp is referred to by Mr. Argall and Mr. Olcott. The amount of the revolution is dependent upon the height and speed of the drop, and upon the amount of grease upon the cam. Occasionally, when the cam surface has too much lubricant upon it, the tappet slips past without causing any observable turn. At four different mills, working under dissimilar conditions, I have noted the turn to be as follows:

MILL.	Stamp, lbs.	Drop, inches	Speed $\frac{1}{2}$ min.	Amount of Turn.
Hidden Treasure, Gilpin Co., Colorado.....	550	17	31	1 to 1½ revols. per drop.
Garden Gully United, Bendigo, Victoria.....	780	9	80	1 revol. in 4 to 9 drops.
Harriettville, Ovens, Victoria.....	700	8	70	1 revol. in 4 to 7 drops.
North Star, Grass Valley, California.....	850	7	84	1 revol. in 5 to 8 drops.

As to the practical effect of the turn there is evidently much question. If the stamp turns as it is being lifted, it must continue to turn slightly after the cam has passed from under it. That the result, as far as it affects the ore upon the die, is insignificant in most cases may be admitted; but it is supplemented by another factor, namely, the inequalities of the surface of the shoe. The effect of the latter is various, sometimes causing the stamp to move bodily out of the vertical (a movement soon checked by the guides), and at other times causing a revolving motion. The die, of course, also wears unevenly, but as it is covered with ore, this fact has not the importance in this connection which must be allowed to that "cupplug" of the shoe which promotes an irregular grinding action against the ore.

The use of a modern form of the arrastra at the Pestarena mill is quoted. The extraction, according to the report of the company, was 81 per cent in 1888-89, and 78 per cent in 1889-90. The loss of mercury in the respective years was 230 and 234 grammes per metric ton, equivalent to about 7½ pounds per short ton. The capacity of each mill was two-thirds of a ton per day. No doubt machines of the arrastra type will, in many cases, give the best conditions for promoting amalgamation; but, as compared with the stamp mill, most machines of the grinding class have a very small crushing capacity, and consume a great deal of mercury.

In commenting upon my description of the Gilpin county milling practice, Mr. Argall has made a series of verbal criticisms which seem to me unnecessarily hypercritical and occasionally unfair. I reply to them only so far as to make my meaning plain, using the numbers employed by Mr. Argall.

(1) He points out "that if the pyrites remained longer in

ore inside the battery longer than is necessary for pulverization, in order to give more opportunity for amalgamation. The ore is mainly pyritic, and it is the pyrite that is immediately associated with the gold, therefore I spoke of the pyrites remaining in the mortar longer than was necessary for crushing purposes, but not "longer than the other portions of the ore."

(2) My statement that "the long drop gives the interval of time required to allow the settling of the fine gold" is true. All the gold of the ordinary Gilpin county ore is fine, and because it is fine, the present system of reduction is employed. The character of the amalgam, and the low retort yield, are indicative of the minute subdivision of the gold particles. There was no comparison made or intended by me between the "coarse" and the "fine" gold in the ore, and Mr. Argall controverts his own imagination.

(3) It is quite possible to comprehend my statement without supposing the gold to be endowed with "the potentiality of locomotion." The deep discharge and the roomy mortar, both "jointly" and "severally" afford a chance for the gold to get out of the way," because the depth of the one and the roominess of the other prevent the making of a violent splash, such as is produced in a narrow mortar with a shallow discharge; and the smaller force of the splash prevents the rapid exit of the pulp through the screen, and enables it to remain inside, so that the gold which it contains may be collected by the mercury lying at the bottom of the mortar, and by the amalgamated surface of the inside copper plates. If the discharge were shallow, and the mortar narrow, the gold could hardly get out of the way of the falling stamp without making its exit through the screen, and therefore, in the case of ore carrying gold in the finely divided condition which characterizes the Gilpin county mill stuff, it would not be possible to save more than a very small percentage inside the battery. It is indeed true that in California and Australia a good proportion of the gold is often arrested inside the mortar, but such gold is considerably coarser than that caught upon the amalgamated tables outside; and, moreover, the ore itself is of a different nature, and the gold is essentially less fine than that treated by the mills of Gilpin county.

Referring to the interval which occurs between the successive drops of the stamp and the pause which is thus occasioned, enabling the particles of gold to settle and become amalgamated, I remarked that "in a Colorado mill the interval is two seconds; in California it varies from three-fifths to two-thirds of a second." This was said in comparing the relative frequency of the agitation to which the water in the mortar is subjected by the action of the falling stamp. It is quite unnecessary to point out that there are five stamps in each battery, and that therefore the duration of the interval should be divided by five. If we carry out this line of reasoning we shall conclude that there is no time of absolute quiet, for when none of the five stamps of any particular battery are falling, the water is still being agitated by the concussion produced by the stamps falling in the mortar boxes on either side.

As regards the warming of the water in the mortar by the conversion of wasted energy into heat, I did not consider it very considerable; but, it may be, nevertheless, sufficient to add to the solubility of certain portions of the ore—as, for instance, partially oxidized pyrite. A careful test made at the Gover mill, Amador, California, gave the following results:

TEST OF THE TEMPERATURE OF THE WATER BEFORE AND AFTER LEAVING THE BATTERIES, JAN. 10, 1894.

Time.	Before.	After	Temperature of air.
8:30 A. M.....	37.0°	40.6°	46° F.
8:30 A. M.....	38.0°	40.5°	46° F.
8:30 A. M.....	38.6°	40.5°	46° F.
3:30 P. M.....	45.0°	40.0°	50° F.
3:30 P. M.....	43.0°	46.0°	50° F.
3:30 P. M.....	43.5°	44.5°	50° F.
3:30 P. M.....	43.0°	45.0°	50° F.
4:30 P. M.....	42.0°	44.0°	48° F.
4:30 P. M.....	42.0°	45.6°	48° F.
4:30 P. M.....	42.0°	45.5°	45° F.

(To be continued.)

THE Austin Reveille has a story of a rancher who is said to be killing range horses and feeding his hogs upon the carcasses. He has Indians to do the killing by shooting the horses with a rifle. The horses are very wild, but the Indian slips upon the hand, and succeeding in shooting one horse down, the others throw up their heads and tails and plunge about in dismay, every few minutes going closer to the dying animal, when another is brought down, and so on, until lately one Indian killed in a few minutes one entire band of twenty-seven horses.

THE walls of Babylon were 350 feet high and 100 feet thick at the base.

DELAWARE is the lowest State and Colorado the highest above sea level.

The Economic Advantages of Smelting Pyrites by Utilizing their Fuel Qualities.

That pyrites can be ignited, and after ignition will continue to burn, has long been known; and advantage is taken of this property by acid manufacturers, who burn them in kilns without the use of any fuel whatever, subsequently converting the fumes into sulphuric acid. But it has remained for modern science to show that these pyrites can also be made to replace, to a large extent, the coke ordinarily used in smelting ores of copper, nickel, gold, etc.

This method of smelting sulphide ores, which consists in making available the heat stored up in their iron and sulphur contents, is what is technically known as pyritic smelting, and has been thoroughly discussed in recent scientific publications (notably in the *Bergund Huettenmaennische Zeitung*, Vol. LIII, page 42, and in the *Chem. Zeitung*, 1893, No. 99; 1894, No. 9; and in the *Engineering Magazine*, April, 1894), so as to warrant taking up further valuable space in this journal. Any one wishing to inquire further into the scientific and technical points involved in this method of ore reduction can address Mr. W. L. Austin, Denver, Colorado, but the special object of this present article is merely to emphasize some of the pronounced advantages of pyritic smelting when applied to suitable ores, as compared with other processes of ore reduction. The first point which merits attention is the great saving of both time and money effected by

AVOIDING THE ROASTING OF ORES.

It is well known that in the ordinary methods of treating pyritic ores, such, for instance, as the great pyrites deposits of Spain and Portugal, or those of Norway and South America, the first step in all such operations is the roasting of the ores. Great heaps of the mineral are piled up and set on fire, and allowed to burn slowly until the pyrites are converted into oxides, which are subsequently smelted or treated in some other way, for the extraction of their valuable contents. This burning—or roasting, as it is called—requires weeks, and sometimes months, for its completion, during which time large amounts of capital are tied up in these heaps and therefore unproductive. In the case of large and important mines, the year's interest account on the money lying idle in roast heaps becomes a factor of no small importance. Therefore, pyritic smelting, which method takes the raw sulphides from the pit's mouth and with no preparatory treatment whatever dumps them into a blast furnace in pieces of any size that a man can lift, and within twelve hours turns out a concentrated product ready for the market, offers advantages so manifest as hardly to require comment. All the cost of labor employed in breaking, piling and burning the raw ore is saved, and in one operation (or where high concentration is desired, in two operations) the low grade ore is converted into a product (matte) which is only reached in the older methods by breaking, roasting and repeated smeltings. A second very material advantage gained by pyritic smelting is the

INCREASED CAPACITY OF FURNACES,

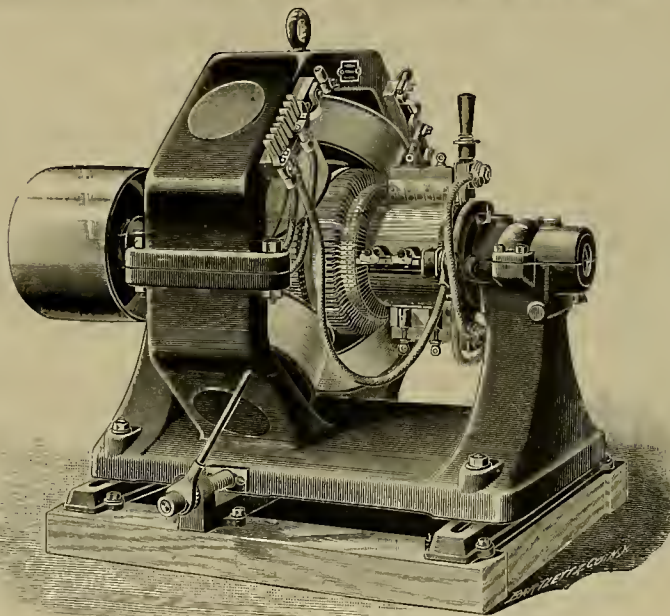
For, by utilizing the fuel qualities of the ores themselves, very much more material can be run through a furnace of a given size than where tons of coke and charcoal must be consumed together with the ore. It requires time to consume carbon fuels, and where these are omitted from a furnace charge it stands to reason that more of the paying material (ore) can be added to the charge. Actual practice has clearly demonstrated that when a blast furnace is operated with pyrites instead of coke, from 50 to 100 per cent more ore can be passed through it than by the old methods of smelting. This would naturally be expected, because the sulphides of iron, etc., are extremely fusible, and softening before the high temperature produced by the combustion of the iron and sulphur, they melt down rapidly and burn before the powerful air blast used, creating an intense heat, which in turn melts the batch of ore next above. Furnaces with an area at the tuyeres of 30 square feet (a size now commonly used for smelting purposes in western America) will smelt from 150 to 200 tons of raw sulphides in 24 hours. The labor necessary around a blast furnace is comparatively small, so that handling such large quantities of ore in so short a time and at so small expense necessarily reduces the cost per ton of ore smelted to the minimum, and permits the handling of very low grade ores.

Under favorable conditions the cost of producing concentrated matte from raw sulphides, taking the latter from the pit's mouth and handling 200 tons per diem, will not exceed \$1.50 per ton of ore. It is generally admitted by metallurgists that the most complete extraction of metals from their ores is accomplished where it is possible to employ fusion, and therefore the smelting process is always adopted where admissible. But very often the cost of fuel (coke, etc.) is so great as to preclude the

use of this method of reduction, and therefore a method of smelting in which

NO COKE OR CHARCOAL IS USED

Is a desideratum. That pyrites in itself contains sufficient calorific power to support unaided a smelting fusion has been so clearly proven as not to admit of argument at the present time, and it would be manifestly a disadvantage to employ two separate and distinct classes of fuel at the same time and in the same operation; for there would necessarily be some difference in the combustibility of the two materials, and one would burn before the other, which would lead to disturbances in the working of the apparatus. Where sulphides and coke are both burned in a blast furnace, the latter burns first, and the heat thereby produced only serves to melt down the former, which runs through the furnace in the form of monosulphide and comes out otherwise unaltered. This is a self-evident proposition when one stops to consider the chemical reactions which take place, for the coke being a simple element unites readily with the oxygen of the blast, whereas the pyrites, which are compounds of sulphur and iron, must first have their elements dissociated before they can combine with the oxygen. This is the explanation why sulphide of iron (matte), when melted in a furnace with carbonaceous fuel, comes out in the same form as that in which it is put in, practically in the same quality and in the same amount as charged; and it also explains why it is wasteful and unnecessary to use coke in pyritic smelting, when there is sufficient sulphide of iron in the furnace charge to give the



THE ELLIOTT-LINCOLN DYNAMO AND MOTOR.

requisite heat for the operation. With a proper arrangement of the ores, fluxes, etc., concentrated matte can be produced without the aid of carbonaceous material in the charge, and therefore the saving in cost of treating ores over other methods is apparent, the fuel item alone being often an impassable barrier to the working of some low-grade mineral deposits.

One of the first things to be considered in all metallurgical operations is obtaining a

HIGH PERCENTAGE OF EXTRACTION,

And this can be safely counted upon in pyritic smelting when comparing the various processes available in a given case. In this process we have to deal firstly and mainly with the sulphides or arsenides of iron in one form or another, and secondly with the metals—copper, nickel, gold, silver, etc. Now we know from experience in Bessemerizing mattes, etc., that as long as the sulphide of iron is present it alone is slagged off, being far more easily oxidizable than the latter metals. The same principle holds good in pyritic smelting. The sulphur burns off, or combines with the copper, nickel, etc., while the iron is oxidized to the protoxide, in which form it combines with the silica present to form a slag. As long as sulphur is present the copper, nickel, etc., on account of their strong chemical affinities to this element, necessarily unite with it to form sulphides, and, therefore, unless the concentration is carried too far, the slag will be found to be practically free from these metals. Sometimes it is desirable to divide the operation into two parts, concentrating up to a certain point in the first smelting, and then carrying the treatment to a finish in the second. If the useful or precious metals go into the slag in any quantity in the second operation, this slag can be returned to the first smelting, where it is of service in assisting in the even operation of the furnace. Experience has demonstrated that the saving of the useful and

precious metals in pyritic smelting closely approximates, if it does not equal, that obtained in the older methods of smelting.

One of the most disagreeable features connected with the treatment of large quantities of sulphide ores by the methods so long in use is the enormous quantities of noxious gases turned into the atmosphere, devastating large tracts of country and causing damage to vested interests. Any method of handling sulphide ores by which the

SULPHUROUS FUMES CAN BE UTILIZED,

Or at least rendered harmless, would in itself be a vast improvement. In pyritic smelting, almost all the air is utilized in oxidizing the sulphur and iron, so that the gases escaping from the tunnel head are in a concentrated form, and can be made available for manufacturing sulphuric acid, or readily condensed in suitable towers and thereby prevented from escaping into the air. That these gases are very highly concentrated is evident from the fact that they are often tinged with the yellow color of the sulphur itself, or burn on the top of the charge, and they are therefore in a suitable condition for acid manufacture.

It was considered necessary, when this system of smelting was first introduced, to employ costly (as well as cumbersome) hot-air stoves to heat the blast before it entered the furnace. This apparatus is no longer considered essential, and the first cost of plant is greatly lessened by their omission. Further improvements recently introduced, and for which patents are now pending, will enable the use of much smaller furnaces than were at first thought possible, and provide miners with the means of working small batches of sulphides at a very low cost per ton.

The Elliott-Lincoln Dynamo and Motor.

The cut shown herewith illustrates the type of motors and dynamos manufactured by the Elliott-Lincoln Electric Company of Cleveland, Ohio.

As will be seen, the machine, which is four-poled, has but two field coils. The two direct poles are on a vertical line, and the two consequent poles are on a horizontal line. It will be noticed that all the iron on the outside of the frame is of one polarity, and consequently there is no external magnetism; in other words, it is ironclad.

The commutator has in it 91 segments, and is provided with only two brushes, set at an angle of 90 degrees on top of the commutator.

Combination brushes are used on the machine for all voltages. The back of the brush, or that part which the commutator comes to first in its

revolution, is of copper, enabling the current to be carried to and from the commutator without the loss incurred by the use of carbon brushes, due to the high resistance of carbon. The other side of the brush, however, is of carbon, which serves to wipe out the spark and prevent either commutator or brush from cutting under any circumstances.

The bobbins are wound in a lathe on a form. As the coil is being wound it is thoroughly saturated with an insulating varnish. After removing from the form the coil is taped all over with a double layer of adhesive tape.

After the proper number of coils has been obtained, they are laid on the armature, which has been previously thoroughly insulated.

The method employed of laying on the bobbins corresponds to the horizontal method of winding, by means of which the difference of potential between any two bobbins adjacent to each other is only a few volts.

After the armature core has been covered with one layer of bobbins, a layer of insulation (consisting of canvas and oiled band paper) is laid over it and the second layer of bobbins is put on. Then follows the banding required in any drum armature.

MUCH time and money have recently been spent in scraping off the oil that found its way from the condensers and feed-water into marine boilers. It is believed that a perfectly efficacious remedy is to put into the boilers some redwood sawdust, which by attrition cuts off the oil, and by affinity absorbs it, leaving the whole as a loose granular deposit in the bottom of the boilers. This fact was apparently established by a late experiment in which a battery of boilers badly oil-coated were perfectly cleaned in a few days with no expense or detention whatever.

THE human family is subject to 45 principal governments.

Scientific Progress.

The Earth Out of Repair.

Observations are to be made simultaneously at Washington and at Manila, in the Philippine islands, which is almost directly opposite Washington on the other side of the globe, to see what is the matter with the axis of our planet. Observations show that for some time the earth has not been revolving on that important, if imaginary support, as she has done for centuries, and scientists have decided that it is time to find out if possible what it all means. Those who have studied the subject declare that if the variations continue, in the course of some very long and very indefinite period, we shall have an Arctic climate, and the latitude of every place on the globe will be changed, and our geographies will be useless.

An equatorial telescope has been finished and sent out to Manila, and before long, diligent inquiry will be made into the whys and wherefores of the peculiar performances of old Mother Earth. While one set of scientists is trying to find out about the axis, another party is endeavoring to find out why the magnetic needle varies so.

Lives Sacrificed over Engineering Constructions.

According to M. Eiffel, the cost of any big engineering work in lives can be estimated with at least as much accuracy as the cost in money. "It has been ascertained," he said, "by statistical observation, that in engineering enterprises one man is killed for every million francs spent on the work. If you have to build a bridge at a cost of 100,000,000 francs, you know that you will kill 100 workmen." The argument, while rather an ingenious one, is not, we believe, borne out by facts. Take the Eiffel Tower, for example. Six and a half millions worth cost only four lives. The Forth Bridge, on the other hand, a contemporary points out, cost 45,000,000 francs, while the lives of 55 men were sacrificed in connection with its construction. Then in regard to the Manchester Ship Canal, only 130 lives have been lost against an expenditure of 325,000,000 francs.

Smokeless Powder.

This explosive compound consists of a combination of an ammonium chlorate, potassium or sodium picrate, and ammonium picrate. Ammonium bichromate gives good results and is very stable. The materials are mixed in the proportion of about 20 parts by weight of ammonium bichromate, 25 parts of potassium picrate, and 55 parts of ammonium picrate. The potassium picrate is first ground in a moist condition until it is sufficiently fine; the ammonium bichromate and ammonium picrate are ground separately, and mixed in a sufficiently damp condition until they are intimately incorporated. The potassium picrate is then mixed with these ingredients in a powder mill. The mass is then placed in a press and pressed into cakes, these cakes being afterward broken up and granulated, after which the powder is dried at a temperature of from 100° to 125° F.

SINCE Professor Lippman first showed his picture of the solar spectrum to the French Academy of Sciences some three years ago, his experiments have been continued with results that promise an early solution of a perplexing problem. His recent pictures include a stained-glass window, in which red, blue, green and yellow panes were brought out after an exposure of many hours to sunlight; a group of colored draperies, which was successfully photographed in ten minutes by electric light, with a many-colored parrot and other objects taken with shorter exposures. Green foliage and gray stones came out well, but the sky had an in-

aligo hue. By the Lippman process the colors are all taken in one picture, the method consisting in exposing a transparent plate with its film side resting on a reflecting surface of mercury, the interference of the incident and reflected light dividing the film acted upon into layers corresponding in distance apart with the wavelength of the incident light, and reproducing by reflection the color which produced the layers.

It is, perhaps, not generally known that petroleum can now be produced artificially by a very cheap and simple method, being the distillation, in a strong iron vessel, under a pressure of 25 atmospheres, of the animal fats and oils at a temperature of 300° to 400° C. Under favorable conditions 70 per cent of the fatty oil is transformed into petroleum, which is 90 per cent of the theoretical yield. The product thus obtained has been found to be in every particular identical with natural petroleum. It is suggested that, with modifications of conditions in the process, oils of different grades may be produced.

M. F. WALTER has found that an alloy consisting of ninety-five parts of tin and five parts of copper adheres so tenaciously to glass that it may be employed as a solder to join the ends of glass tubes. It is obtained by adding the copper to the tin previously melted, agitating with a wooden stirrer, casting or granulating, and then remelting. It melts at about 360° C. By adding from one-half to one per cent of lead or zinc the alloy may be rendered either softer or harder or more or less easily fusible. It may also be used for silvering metals or metallic thread.—Revue Scientifique.

ELECTRIC CURRENTS in plants are due, says Kunkel, to the movements of water in the tissues, and not to differences of potential, existing independently. It was considered probable that vegetable electricity was due to biological processes, especially respiration and the consequent chemical changes. In experimenting with leaves and flowers dicotyledons and on a large mushroom in an atmosphere of hydrogen, it was found that the electric current was diminished, but never quite suppressed, owing, probably, to intramolecular respiration. The electric current revives on air being readmitted.

In a new primary battery devised by Mr. H. C. W. Emery the cells are formed in the shape of a ship's rudder, the elements being suspended vertically from the mouth, which, as compared with the lower part of the cell, is of small area. The elements consist of zincs and carbons, and when the battery is in its normal position they are immersed in the electrolyte, which is a solution of chromic acid. The battery is laid on its front, so as to bring the cells and the elements into a horizontal position, when it is required to stop its action.

M. MAX SCHULER is said to have discovered, in the joints of persons attacked with chronic articular rheumatism, bacteria, which are always identical in like cases. These bacilli are short and thick, having at each end bright grains which aniline colors make still more evident. The discoverer has been able to cultivate these bacteria in bouillon, or gelatine, or on a piece of potato. Their culture requires a temperature of at least 25 degrees, and darkness is indispensable. When shall we have anti-rheumatic vaccination?

THE measurement of the illuminating power of arc lamps by ordinary means, with any approximation to accuracy, has long been recognized as a practical impossibility. It is now proposed that a 2000-candle power arc lamp shall be understood to be one requiring an average consumption of energy of 450 watts, the measurement being made at lamp terminals, and with an appreciable resistance in circuit with the arc. It is to be

hoped that the definition will be accepted, and this much-vexed question finally disposed of.

THE internal temperatures of trees has been investigated in Belgium by N. W. Prinz, who finds that, as a rule, a large tree is warmer than the air in winter, and a little colder than the air in summer. The mean annual temperature of a tree is practically the same as that of the surrounding air, but the monthly means differ by several degrees.

A POWERFUL LIGHT has been invented by Herr Ludwig of Bremen, produced by evaporating and gasifying petroleum. The light is white and has a candle power of from 3500 to 12,000, with an hourly consumption of less than a quart of oil to each thousand candle power.

SUCH has been the growth of popular opinion in favor of the sudden disposition of the dead by heat that there are now in the country 18 incorporated cremation societies, and during the past ten years about 3000 cremations have taken place.

THE most profitable street railway in the world, says the *Electrical Review*, is the Broadway cable in New York, which is now said to be earning 50 cents per car-mile, the biggest record ever made by a street railway company.

THE scales used in the London Mint can show a difference in the weight of a card after a name has been written upon it.

WITH the aid of platinum wire, a battery and an electric bell, one can hear a plant grow.

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Mechanical Progress.

A Lost Art Found.

A Des Moines, Iowa, man claims to have discovered the lost art of making what is known as Damascus steel. In proof of his assertion he is now making specimens of his new steel products, and has submitted them to eminent scientists, who have not been stinted in their declarations of favor and wonder. The new steel can be made at one-half the cost of modern steel. In addition to that, it has the quality which the best steel now made has. It tempers two points higher than ordinary steel and within two points of the diamond. It contains no carbon, requires no rolling, the finished product may be molded instead of hammered, and its tempering possesses the quality of springiness. He takes common refined wrought iron and fuses it in a crucible, and adds his chemicals, the secret of whose combination constitutes his discovery. He pours the molten metal into the mold of the sword blade, knife blade, or whatever he may desire to produce. It cools, it is tempered, it is polished and the article is finished. The process takes about an hour. The product is harder than any steel ever made; it may be bent without breaking; it has no carbon in it, and when the chemists examine it their analysis shows nothing but wrought iron. The manufacture of the finished steel articles, as they are made now, takes sometimes a month. He has applied his combination of chemicals to the manufacture of bronze. He makes the hardest bronze ever manufactured. He has not patented the idea, and will not, but when he shows to the world a sword blade that bends double, and then springs to its original straightness, that will cut a feather pillow or a bar of steel or iron, and yet whose analysis shows nothing but wrought iron, though it is four-fifths as hard as a diamond, he believes the world will appreciate the fact that he has discovered Damascus steel.

An Automatic Electrical Horse-Feeding Appliance.

An electric horse-feeder is a new invention for securing the regular feeding of horses during the absence from any cause of the stableman. The apparatus is very simple, the law of gravitation being depended upon to accomplish most of the work. The first requisite is an alarm clock, which should be good enough not to stop casually, but need not be expensive. The electrical plant is that needed for an ordinary electric bell, four cells of the Lelanche type of battery being sufficient for any distance up to 200 yards. The third portion of the apparatus is the feeder—that is to say, the vessel holding the grain. The clock, which is the prime mover of the whole concern, may be in the house, the harness room or anywhere, but if it be more than 200 yards away from the feeder a more powerful battery will be required.

To use the feeder, the first thing is to set the alarm of the clock at the hour at which it is desired that the horse should be fed. The food is then placed in a tin-like biscuit box, which is turned upside down and placed in the proper compartment of the shoot, when the lid of the box is drawn out; the grain then resting upon the floor of a trap-like arrangement, held in its place by a simple contrivance. When the alarm goes off a button is pressed, and the circuit is completed. A weight falls, the bottom of the feed box is released and the grain falls out into the manger.

Speedy Engines.

For the past several years English and American locomotive builders have experimented on high-speed track engines, and a machine of 90 miles an hour is the best they can turn out. A Frenchman has succeeded

in constructing an engine that by many tests shows a speed of 150 miles an hour. His engine does not turn the wheels, but works a dynamo, which generates a current, and this current is used to run a motor, and the motor is connected up to the wheels so that they can be revolved at any rate of speed desired, which steam in a cylinder cannot do. Of course the dynamo is located on the engine.

Firing Guns at Sea.

To one unaccustomed to the experience, it is anything but pleasant to be on board a line-of-battle ship at sea when the big guns are being fired. Before they are discharged the decks are cleared for action, and all the chairs in the cabin are laid down and tied together, while every bit of movable furniture is secured. The doctor goes round and makes sure that every man has had his ears stopped with cotton wool. The concussion when the charges are fired is tremendous, and the iron-clad quivers from stem to stern with the vibrations; in fact, the shock of the explosion is so great that every pane of glass in the skylights is invariably shattered, and much of the ornamental woodwork is splintered. After a few hours of this rough play the carpenters have a busy time in making things look presentable once more, for the ship resembles a wreck when she has finished her practice. Nobody likes it. The sailors standing by the big guns sometimes find themselves thrown all in a heap across the deck, and after an hour or two officers and men become as black as sweeps. It is impossible to be well out of the way of the annoyance, though perhaps the one place in the vessel where the guns trouble the crew the least is down in the engine-room, which is below the level of the deck upon which most of the armament is put.

The Largest Map in the World.

The giant of the map family is now in course of preparation and construction at Washington, D. C. It was begun over 12 years ago under the supervision of the United States Geological Survey Corps, and it will not be more than half completed at the end of the present century. Some idea of the gigantic plans upon which this map is being constructed and of the magnitude of such an undertaking may be formed by considering the fact that the portion which delineates the little State of Connecticut and the northern tip of Long Island is six feet in length and nearly five feet wide. When this wonderful map is finished, it will indicate the exact location of every brook, creek, river, hillock, mountain, valley, farm, village, schoolhouse and city in the land, and will show every public and private road and highway as perfectly as the surveyor's map gives them in the townships. When completed, this map will cover almost an acre in superficial area. This being the case, it cannot be either hung up or spread out, and in order to make the information it contains available, it will be issued on the sectional plan.—St. Louis Republic.

A Mile a Minute on the Sea.

A Welsh engineer has prepared designs for a vessel which he claims will attain a speed of 60 miles an hour. His proposed vessel is flat-bottomed, 550 feet long, 50 feet in width, wedge-shaped at each end for 100 feet of her length, with a displacement of some 14,600 tons. Such a vessel, fitted with 16 paddle wheels, driving at 170 revolutions a minute, this sanguine inventor believes would be propelled through the water at the rate of 60 miles an hour. This would be breaking the record with a vengeance, for the Lucania, which has just eclipsed all previous performances, averaged barely 22 miles an hour. The 16 paddle wheels of the proposed express passenger steamer would be placed eight on each side, one behind the other in a water channel running

fore and aft just above the ship's bottom. They are of a peculiar construction, the paddle always maintaining a perpendicular position, and always entering and leaving the water at exactly the same point.

Incandescent Lights.

The beautiful little glow lamp, with its fragile hulk and delicate filament, is a far more interesting production than its massive and cumbersome progenitor, the arc lamp. The process of manufacturing the carbon filaments from bamboo threads is a long and intricate one, and is carried on in strict seclusion as a trade secret. But we can see the quick-fingered girls pick up the hairlike filaments and joint them to the little pieces of platinum wire which are fused into the neck of the bulb; to the platinum wires are soldered other pieces of copper wire, which connect with the brass screw cap and nut, insulated from each other by plaster of Paris, that form the base of the lamp.

When the filament is inserted in the bulb and the base sealed up, the tube which projects from the top of the bulb is connected to a mercury air-pump to exhaust the air from the bulb; this done, the tube is cut off and the hulk sealed up at the same moment, leaving the little point or cone that is to be seen on the top of all incandescent lamps. There are many intermediate operations in the evolution of the glow lamp, and every part of the work is checked by the most careful supervision, and each lamp is closely examined and tested before being wrapped and packed for shipment. The carbon filaments must be accurately measured and their resistance tested, the platinum wires must be just so long—or, rather, just so short—and no longer; every joint and connection must be perfect, and every juncture of glass with metal must be rigorously airtight.

A PRINTING PRESS is now building for a New York paper which will print a sheet in black ink, as usual, upon one side, while upon the other it prints four colors, and will do this at the rate of 20,000 four-page papers per hour. It not only prints, but also inserts the pages together properly, pastes them in place, and counts the papers in bundles of any desired number.



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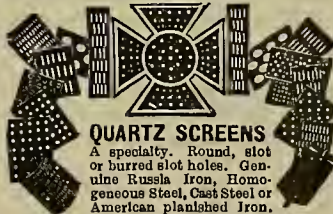
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Electric Progress.

Railway-Track Construction.

The electric welding process which has for some time past been considered with reference to constructing railway lines with continuous unjointed tracks has been experimented upon from time to time on various tracks sufficient to point to the adoption of this method of construction in the future. There are many advantages to be gained by the use of a continuous unjointed rail from a mechanical point of view, and it is especially desirable for an electric railway on account of securing a continuous return circuit without the use of rail bonds.

Rail joints are the weakest part of a track system, and any number of devices have been tried to reduce the wear at these points; but with the most rigid construction the ends of the rails break down and wear out much sooner than any other part of the rail, and as soon as any wear takes place there the hammering of the wheels interferes very materially with the comfort of traveling and introduces a difficulty in attaining high speeds.

The former practice in track laying was to separate the ends of the rails at the joints an eighth of an inch or more. In this case the pounding of the wheels was so severe that the joints could be easily counted by a passenger riding on the train. As railway speeds increased, this space at the joints has been decreased and the connections at these points made as rigid as possible without experiencing any trouble from expansion.

The usual rail employed in electric street railway work is a deep girder pattern which is imbedded in the roadway, and which, therefore, should be less subject to variation in length from the extremes of temperature in summer and winter than the T rails on the steam roads, which are entirely exposed to the air.

The effect of temperature upon a continuous track has been experimented upon, and the results show that there is no motion of the track between wide ranges of temperature. The effects of expansion and contraction are confined to a slight tension or compression of the iron, which is shown by a very small variation in the section of a rail.

All practical considerations, therefore, favor the adoption of a continuous rail, and the only difficulty in the way of this method of track construction is in providing a suitable means of welding the joints without injury to the metal, and herein seems to lie the chief weakness of the system.

A considerable length of track has been welded in Boston on some of the electric lines in that city, and while no effect has been found to result from expansion, there have been about ten per cent of the joints broken in service, which must be attributed either to the tension on the rails due to contraction, or to the weakness of the joint due to the welding process. It is probable, however, that defects in the welds are accountable for the breaks, as this trouble has not occurred in tracks where the ends have been mechanically connected without any provision for contraction. The fact that the breaks occur also at the welded joints and not in any other part of the rail is very good evidence that the welds are not as strong as the body of the rail.

This subject is called to prominent attention at present by the announcement that a new Brooklyn electric railway company is preparing to install about 100 miles of track all of which is to be welded by the electric process. The method generally employed for this operation is to equip a car with the necessary converter, which is run from the trolley line, and the welding machine, the latter being placed in a convenient position for attaching to the rail joints as the car passes along the track. In welding a nine-inch girder rail, in which the section of the joint was about 25 square inches, the elec-

trical energy required was found to be about 150 kilowatts. The joint may be easily straightened with a hammer while the metal is still red hot.

The advantages of a continuous rail for electric railway work lie principally in the saving of labor and repairing that are necessary where rail bonds are used, and a small amount of supplementary wire in the ground circuit. There are comparatively few roads on which the bonding and connections of the return circuit have a conductivity equal to that of the rail, and this condition naturally introduces extra resistance in the return circuit.

The chief objection to welding tracks at present, therefore, is the difficulty of making the joint as strong as the rail, and if this can be overcome the method will find a very wide application.—Electricity.

Electric Riveting.

Electricity has come into play in about every branch of mechanics, and it is not surprising that riveting by electricity is a success and an important improvement in the industrial arts. The apparatus consists of a transformer, the primary of which is formed of a heavy copper bar laid parallel to a coil of fine wire, and over the two are clamped angular segments of iron, forming when united a completed iron shell, increasing by this arrangement the efficiency of conversion. The structure creates a current of great volume in the copper bar, and in the end of this bar are mounted an anvil (having a regulating screw for moving it up or down) and a follower provided with a screw. In the circuit of a primary is placed a choke coil provided with a regulating switch for cutting in more or less of the coil, by which the strength of the current induced in the secondary may be controlled. The bars or pieces of metal are placed upon the anvil and the rivet dropped in place, the handle being then screwed up until the plates of metal are firmly held between it and the two insulating legs secured to the upper limb of the copper bar. The face of the bar is covered with insulating material except at a central point where it is left bare; and when forced against the rivet, the latter establishes connection from the upper limb, or the primary bar, to the lower limb, the current developing sufficient heat to make an upsetting of the rivet shank very easy under the pressure of the screw.

The Forge Superseded.

George D. Burton of Boston, before the Franklin Institute of Philadelphia, recently, showed the method of heating by plunging the metal to be heated into a bucket of water and passing a strong current through it. The apparatus consisted simply of an ordinary wooden bucket containing a large sheet of lead which formed the positive pole and an iron bar laid across the bucket forming the negative pole. The metal to be heated was held in the tongs, which were rested on this iron cross-piece, and dipped into the liquid as desired, thus avoiding all flexible connections with the tongs. Two ordinary nails held in the tongs and dipped in the liquid were heated to a welding heat in a few seconds, after which they were welded on an anvil with a few blows of the hammer. In another experiment they were welded by simply allowing them to fuse together. A large soldering iron was heated red-hot in less than a minute. Pieces of clean steel were heated to redness to show that they were not burnt, as in the ordinary forge.

The solution which he found to be the best, after a long series of experiments, is made of a solution of ten parts of carbonate of soda and one of borax, dissolved in water until the specific gravity at 70° is 1.150. The current was taken from the street mains and at about 240 volts. It appears that no means of regulating the current were used, as the metal itself and the depth of immersion acted

as the regulator. He claims to have made the first public exhibition as early as October, 1890.

Electricity for Reporters.

A tiny electric light fastened to the end of a pencil is a recent invention to enable reporters to make notes in darkness, and to find the keyhole when they reach home. The latter feature of the invention is one which an experienced investigator says will be of use to every one except the man who stays down at the office so late balancing his books that on his arrival at his own door he sees double or treble. The sight of two or three illuminated keyholes would only complicate his difficulties and result in an immediate necessity for the erection of more insane asylums.

GREAT FALLS, MONT., is called the Electric City. A dam across the Missouri, at Black Eagle Falls, three miles above the town, furnishes the electric power for the street car line. Elevators, printing presses, cranes and all kinds of machinery are operated by it. Housewives cook and sew by it, merchants use it for various purposes and rock-crushers are operated by it.

By the device of an Italian seismologist, an earthquake shock is made to light an electric lamp for a quarter of a second, causing the face of a chronometer to be photographed, and thus registering the precise time.

THE use of electricity has made it necessary for sentries on British warships to discard side arms when on duty. The arms become, it is said, magnetized by the dynamos and affect the compasses.

NEARLY all the electrical inventions, excepting the lightning-rod and the telegraph, have come in use since the Centennial Exposition.

Practical Information.

The Telephone of the Future.

The fortunes made in the telephone business have in the past been very large. This is by reason of a monopoly closely holding an article of great convenience and selling it only to persons of more than average means. The great drop in the price will bring its use within the range of moderate means, and although hereafter millions cannot be made by any select few, the average will be very satisfactory to those interested in the further development of the industry.

We are not given to fortune-telling, but we believe that within the next year there will be too lines for private use where there is now one. In the way of small exchanges there will be many installed during the coming summer. At the moment New York dealers have several orders for these on their hooks. In country districts neighbor will co-operate with neighbor, and the whole will terminate at the village postoffice or the country store. Many a trip will be saved in going after a letter that "has not come," and many a little errand performed by a passer-by whose intention of "coming this way" is known in advance.

Then in more populous districts the butcher, grocer and purveyor of the necessities of life will establish short "way" wires to favored customers, and get orders in that manner. The staples will in large numbers be connected with the house, neighbor with neighbor, druggist with physician, restaurant with apartments, and so on indefinitely.

What Makes the Sky Blue?

If there was no dust haze above us the sky would be black. That is, we would be looking into the blackness of a limitless space. When in fine, clear weather we

have a deep, rich blue above us it is caused by a haze. The particles in the haze of the heavens correspond with those of the tube in the konescope and the blue color is caused by the light shining through a depth of fine haze.—Science.

For Sudden Toothaches.

Toothache is a little thing in the books, but many physicians would rather meet a burglar at the door on a dark night than a call to cure a bad toothache of several days' continuance. A hypodermic of morphine only postpones the evil day, and usually the patient is respectfully referred to the dentist. The tooth should not be extracted while the jaws and gums are inflamed and the latter swollen, and it is the physician's duty to treat the case until the above conditions are removed. Always keep a small vial containing the following mixture: Chloroform, gtt. x.; glycerine, gtt. x.; sat. sol. ac. carbol., gtt. x.; morphine, gr. j., with a small wad of absorbent cotton. If the offending tooth has a cavity or decayed surface saturate a small pellet of cotton with the above mixture and put into the cavity or against the decayed surface, as the case may be. Never pack the cotton in or the more is the trouble, but have the pellet small enough to enter without crowding. In most cases this will end the trouble.

When the gums are swollen and tender paint two or three times two minutes apart with a 4 per cent solution of cocaine. This time of year your patient may have been eating a good deal of fruit. The tongue and mucous membrane of the mouth are pale, he has a sour stomach, and next day the toothache will return. Give ten grains of subcarbonate of bismuth and ten grains of phenacetin at once and a smaller dose before each of the three following meals, with a laxative if needed, and stop all fruit for a few days and it will not return. The same powder every two hours, with cessation of fruit-eating, will stop the persistent, tormenting neuralgias so prevalent at this season.—Medical Record.

A Telephonic Bullet Probe.

Those who followed the story of Garfield's last days closely remember with what difficulty the location of the fatal bullet in the dying President's body was discovered. Ordinarily a surgeon probes such a wound with a blunt-pointed, slender and pliable thread of metal, which follows the thread of the projectile more or less easily, and he detects the presence of the ball for which he is hunting by the resistance, and the kind of resistance, it offers to further progress. But even the most delicate sense of touch and the deftest manipulation are often baffled in a search of this kind, and various attempts have been made to use electricity therein. One of the most successful devices for that purpose, invented by Dr. John H. Gardner, of New York, is described by the *Western Electrician*. From a telephone receiver, fitted to the operator's ear, two wires extend, one terminating in a metal bulb, which is placed in the patient's mouth, and the other in a probe. When the latter comes in contact with the bullet, though the operator may not perceive the fact by mere feeling, a distinct rasping sound will be audible in the receiver. Up to that moment nothing is heard. The telephonic probe has been officially adopted, it is said, in the United States army and navy, and in the German army.

Simple Cure for Hiccoughs.

"I was just about to send a cure for hiccoughs to a New York man whose case has been puzzling the doctors, when I read that he had been cured by laughing heartily. All you have to do is to lie down, stretch your head back as far as possible, open your mouth widely, then hold two fingers above the head, well back, so that you have to

strain to see them, gaze intently upon them and take long, full breaths. In a short time you will be entirely relieved of the troublesome hiccoughs.

"Now, I have tried that snre cure on all sorts of cases, from the simple form to the chronic, and it works well with all. I remember it was given to a man on the way to New York to consult a specialist on his case—one of six months' standing—and it cured him in a few minutes. He turned around and said: 'What do you charge for that?' 'Nothing,' was the reply, 'except that you publish it to snfferers.'"—Pittsburg Physician.

Conversational Sounds Among Ants.

It has been suspected that ants communicate with each other by sounds that the human ear cannot perceive. A French observer, M. C. Janet, has now succeeded in making some of their sounds audible, showing that certain species of ants—notably *Myrmica rubra* L. and *Tetramorium caespitum* L.—are in the habit of making a stridulating noise, probably by rubbing together rough parts of the body's surface. The demonstration is simple. A circle of putty is formed on a pane of glass, the ants are dropped into the center, and a glass cover is placed on the ring and pressed down until the ants have just room enough to move about freely. Suitable air holes enable the prisoners to live in this place several days. When the glass box is held to the ear a faint murmur like the gentle boiling of a liquid in a closed vessel can be heard and then distinct stridulations in the midst of the murmuring. These sounds can be distinguished only when the ants are disturbed.

CARL WINSLOW, in a Copenhagen publication, advances the theory that the so-called "canals" on Mars are scratches made by bodies coming into collision with that planet. When meteoric masses closely approach the earth, their friction with the atmosphere generates heat enough to burn most of them up; and the largest masses that ever survive this ordeal and come down to our level, rarely weigh over 100 pounds. Out just beyond Mars, though, lie the orbits of several hundred celestial bodies, called asteroids; and Herr Winslow fancies that these, and not meteors have done the work in question. Some astronomers have thought that possibly the moons of Mars are captured asteroids.

THE extreme age of the various species of trees is set down as follows: Elm, 335; pine, 450; chestnut, 600; olive, 700; the cedar, 800; the oak, 1500; the yew, 2800. Humboldt computed the age of the famous baobab tree, a species of banyan, to be at least 5700. Late authorities give the age of "big trees" in California to be 3000 years.

FROM a report on the production of coal in 1893, compiled by E. W. Parker of the United States Geological Survey, it appears that the total production for the year was 179,326,612 short tons, with a valuation of \$205,256,479.

THE gold yield of British Guiana in 1893, according to the returns of the Department of Mines, amounted to 142,633 ounces. Compared with the returns of 1892, there appears to be an increase in four districts, aggregating 23,262 ounces.

THE hottest place in the United States, according to the 1893 meteorological reports, is Bagdad, Arizona, where the mercury often stands as high as 140° in the shade for a week at a time.

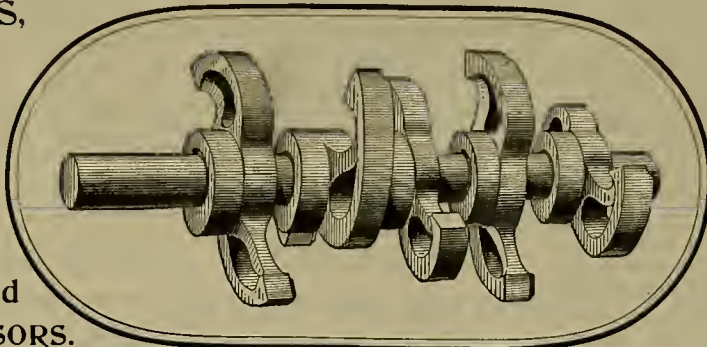
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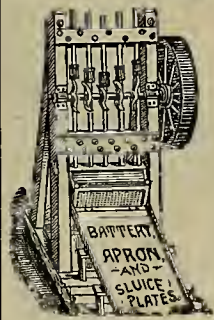
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Usefulness of Tank Steamers.

About all the molasses which comes from Cuba to the United States is brought in the same tanks in steamships that are used to carry petroleum as a return cargo. The ship's tanks are about 16 feet deep and have a neck seven feet deep. They are pumped full of oil at Brooklyn or Philadelphia, then taken to Havana, and the oil is pumped out into the tanks of the refining plants there. Molasses is brought from the interior of the island in huge hogsheads, which are emptied into the storage tanks. A suction pump drawing about ten thousand gallons an hour fills each ship's tanks to within about two feet of the top, that amount of space being required for the expansion of the molasses. It might be supposed that the petroleum would have a bad effect on the molasses, but it has been shown that the contrary is the case; and as nearly one-half the importation is made into rum and the balance refined into sugar, a little oil is not much account. The tanks are cleaned after the molasses has been pumped out by turning in a powerful steam jet, which washes down the sides and liquefies whatever molasses may be left in the bottom of the tank, and the suction pump finishes the work. A cargo of molasses, which formerly required ten or twelve days, can now be unloaded in 48 hours, while the difference in the cost of handling, to say nothing of the saving of time, amounts to a large sum.

The Gulf Stream.

One of the natural phenomena of the earth that has been the subject of almost endless discussion is the Gulf Stream. Various theories have been advanced to account for its origin, but few of them have stood the test of investigation. One very plausible theory is that through volcanic action the basin of the sea has at some time cracked or broken, and that through these fissures water has penetrated the volcanic strata. Intensely heated by the subterranean fires, it rises to the top of the ocean and moves according to the natural law of circulatory currents. The process is as simple as the circulation in the kitchen-range boiler. The water enters the heated locality at one point, becomes hot and rushes out at another. With the extremely high temperature of volcanic matter, it is not difficult to see that there must be tremendous pressure. If the water is confined, and that an enormous quantity may be held in some cavernous basin. The illustration is easily made by the idea of dropping a V-shaped passage into the earth. The low portion is filled with hot water that pours in at one arm or end and out at the other. Given a large passageway, a suitable basin and a fairly active volcano, and a well-developed gulf stream becomes the simplest and most natural thing in the world.

The Torch Fish.

A deep-sea curiosity is the torch fish. This strange creature, with triangular jaws filled with long, slender teeth, a cartridge-shaped tongue and a body not unlike a dilapidated old shoe in shape, has upon the tip of its nose a slender stem bearing an egg-shaped object that may be illuminated at the owner's pleasure, and put out when he so pleases. The lantern does not serve as a guide to its wanderings, but is used as a trap to entice unwary and innocent food fishes. When *Linophyrus Lucifer* is hungry he lights his lamp, which is merely a phosphorescent lip to the egg-shaped body, opens his mouth, and waves before it a slender, cord-like appendage that grows beneath the lower jaw. The small fishes mistake the light for a phosphorescent insect and, in their scramble for this dainty, they fall into the capacious mouth that stands open to receive them. When he has dined to his satisfaction, he turns off the light, and goes about his business.

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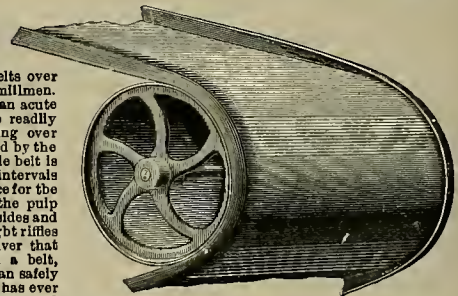
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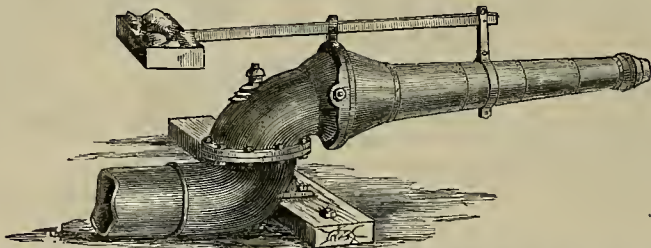
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Mining Summary.

The following is mostly condensed from journals published in the interior, in proximity to the mines mentioned.

CALIFORNIA.

Calaveras.

A FAMOUS MINE.—Stockton Independent: The famous Gwin mine of Calaveras county, a gold-producing property which has a record of having paid the owners something above \$2,000,000 in dividends, is soon to be reopened by capitalists who are confident of restoring the mine to its place among the leaders of the State. The mine is located on the Mokelumne river, about 60 miles from Valley Spring. The property is now in the hands of a corporation formed to work it, and is held under a contract of purchase which gives the company two years to pay for the mine. The purchase price is \$300,000, and the deed is in escrow. The president of the corporation is M. W. Belshaw, the owner of coal mines near Antioch, and the vice-president is Senator F. C. Voorhies of Amador county. It is planned to sink a three-compartment shaft on the vein, starting at a point 350 feet distant from the old works and going to a depth of 3000 feet if it is found necessary. The old vertical shaft was at a depth of 1500 feet when operations were stopped. The old works were extended a distance of 1000 feet along the vein, and there they stopped because the end of the company's ground had been reached. After closing down the company bought an extension of 4000 feet, and this is the ground which will be cut into. The vein runs from 13 to 30 feet in width and the rock averaged \$7.50 in free gold and \$1 in sulphureta to the ton. When work was stopped the vein in the face of the drift was 13 feet wide, and the ore was of excellent quality.

Inyo.

RED ROCK A FRAUD.—Inyo Register: From the report given by Henry McDonald, who returned from Red Rock and Goler a few days ago, it is fair to pronounce that a splendid section to stay away from. He says nothing is done in the way of finding gold, and few, if any are making wages, or anywhere near it. The owners of some of what have been reported to be the best mines in the section, "paying \$20 a day per man," are unable to meet even the smallest obligations. Apparently the agitation is kept up by some who have claims to sell, or have other reasons. McDonald says that the Mexican mine, reported to pay from \$100 to \$1000 a day, was sold for \$300 lately. Hundreds of men have come in there, worked hard to find something paying, and left "cussing the country." Consequently it seems that the best possible advice concerning Goler is to stay away from there.

Nevada.

A GOOD CLEAN UP.—Telegraph: Yesterday the Wisconsin mine had a clean up and the 55 loads yielded at the rate of \$40 per load. A short time ago a crushing of 50 loads, or thereabouts, yielded the plucky workers \$78 per load, and later a crushing of 60 loads paid \$70 per load. The Wisconsin is looking well, having a good ledge in the shaft and in the drifts. The young gentlemen who are working the mine are energetic and enterprising.

A BOOMING TOWN.—Grass Valley Union: The Allison Ranch, when started up, will give employment to between 200 and 300 men. This means that about \$1000 more per day will be placed in circulation in this city than at present, or about \$30,000 per month.

DEADMAN'S FLAT.—Tidings: At the Evening Star mine the water has not yet been pumped out of the lower levels. The new shaft is now down 40 feet.

At the Normandy sinking is continued and the shaft is down 75 feet.

The Picayune gravel claim is being worked by Mr. Torpie, Chas. Cross and the Grant Bros., who have done a great deal of dead work and have just got into the gravel, which will yield about \$10 to the car.

REOPENING THE MERRIFIELD.—On Monday morning work was commenced on the new hoisting works at the Merrifield mine, says the Nevada City Herald. The incline is down over 60 feet, and a hoisting rig will be put on as soon as the building is ready for it. In the course of a few weeks there may be employment there for a few men, as the company are pushing the job with their accustomed vigor.

WILLOW VALLEY.—Herald: There is considerable activity in Willow Valley this spring. Willow Valley has long been known as a good quartz district.

In the Buckeye claim the tunnel is in porphyry, easy to work, and there is a ledge in sight which runs from 18 inches to 5 feet in thickness.

Garner, Jones & Co. are again working the Montana, which has lain idle for several years. Their incline is down 400 feet and full of water. A steam engine has been set up and an eight-inch pump put in, and pumping was commenced to-day.

On the south side of the creek men are prospecting the Murchie, and water power will be put in for hoisting and more men put on in a short time.

OSBORN HILL.—Telegraph: J. B. White is laying off the mill site for the mill at the Osborn Hill mine. The mill will be a 20-stamp one and will be equipped with all modern appliances.

STRIKE IN THE HOME.—Transcript: A strike was made at the Home mine lately which is considered by mining men as one of the most important that has been made in that locality for many years. In the 200-foot crosscut from the shaft a fine ledge of rich quartz was struck, the ore from which shows well in free gold and is heavily charged with high-grade sulphurets.

It is believed that the old original Home ledge has been struck. When worked years ago it was very rich, but for some reason operations were suspended. About a year ago the present company took hold of the mine and erected a hoisting and pumping plant.

Charles Stepp of San Francisco, president of the Home Mining Company, is at present in Nevada City, and feels highly elated over the developments made at the mine.

The mine is situated only a short distance below the Providence, and this strike has an important bearing on the latter mine, inasmuch as it shows more than ever the existence of rich quartz veins in the hill into which the locations of both the Home and Providence companies extend.

MINING NOTES.—Transcript: The Buckeye quartz ledge in Willow Valley district, which is owned by T. B. Gray, is now being opened up by Luke Voice, who is running a tunnel. The ledge runs all the way from eighteen inches to five feet.

The old Montana mine, on which no work has been done for a number of years, is to be worked again. A steam engine and eight-inch pump have been put in place and recently pumping was commenced to get the water out of the 400-foot incline, which is nearly full. Garner, Jones & Co. are the owners.

Three men are prospecting the Murchie mine at a point near the south bank of Deer creek. Water power is to be put in for hoisting, and as soon as this is done, more miners will be employed.

The German mine in Washington district may soon have a new superintendent. John Berra and a company of San Francisco men are talking of purchasing the mine; or if they do not take the German, will in all probability buy or bond some other mine in that district.

The Midnight quartz mine, located on Deer creek a short distance below the suspension bridge, will be worked this season after being idle the past two years or more.

Siskiyou.

MINING OPERATIONS.—Yreka Journal: Hall & Fitch, who purchased the Finley Tribe mine at Salmon river, have a large force of men at work, with plenty of water to keep the giants in constant operation. The cleanup last month of 30 days amounted to \$10,000, and the regular daily yield is not less than \$200, some days more. They are also building a new ditch higher up on White's gulch, so as to have a still better supply of water for running all summer.

The rich find at Horse creek, a tributary of Klamath river, near Oak Bar, has created some excitement, and the country in the vicinity is full of prospectors, who have been staking out numerous claims. No doubt there are some good quartz mines in that section and throughout all the foothills of the Siskiyou and Coast range along the west side of Klamath river, throughout the entire length of Siskiyou county, from near the Oregon line on the north to the extreme corner on the south, adjoining Humboldt and Trinity counties.

Good placer diggings have been discovered at Elliott Creek, on Siskiyou mountain, just this side of the Oregon line, which will be a lively camp this season. Fred Kohls of Oak Bar, J. J. Walters of Klamath river, and others, have located claims. Fred Kohls allowed a couple of men to do assessment work and receive all they made, which has amounted to \$100 a week. There is considerable snow in the vicinity, but not very much where the sluicing down of the banks is carried on.

Wiley Parker and son, who have been ground sluicing at Portuguese Gulch, on Yreka Flats, cleaned up \$500 a few days ago. Owing to the great amount of water at bedrock, they have been unable to get down any deeper at present, and are working the quartz ledge in same claim until later in the season.

The Cherry Creek Mining Co., or Frank Riley and Henry Nixon, have been moving a vast amount of aniferous bank at Cherry Creek, and expect to do well when a cleanup is made. They have two ditches conveying the snow water from the summit of Deadwood mountain to a reservoir, rigged with a self-shooter in sending down when full a great body of water into the gravel sluices. Coarse gold is noticed in washing, and some small nuggets are picked up occasionally.

NEVADA.

Washoe District.

Regarding the Con. Cal. & Va. the Enterprise says that the crosscut 14 feet below the 1650 level, which had cut through 7½ feet of high-grade ore, had been pushed ahead through a narrow streak of low grade, and is again showing fine ore in the face. The advance of this crosscut has demonstrated the probability of the development of an extensive ore body of more importance than any discovery made in the mine subsequent to that of the bonanza 20 years ago.

The Alta mill is now dropping its stamps on ore from the mine, and should the vein in the vicinity of the 725 level continue and improve as rapidly as it has during the past ten days, the mill will be kept in constant operation.

A streak of ore four inches in width was cut through from the lateral drift from the intermediate tunnel in the upper workings of the Sierra Nevada, on Cedar Hill. This ore assays from \$20 to \$30 per ton in gold. The ground now being explored is in a region which has produced a large amount of gold hulsion from the surface workings, and a far more important development is among the probabilities. A shift of six men has been put on in the Crown Point. A night shift has already been put on in the Belcher. It is said that a night shift will be added to the force in the Yellow Jacket before the close of the week.

The Chronicle says: The place of the new find on the 1650 level of the Con. Virginia mine was visited by Superintendents Lyman, Sharon,

Gorman and Keating and Civil Engineer Haist. Messrs. Sharon and Gorman were afterward interviewed as to the appearance of the ore body. Both gentlemen expressed themselves favorably concerning it. Mr. Sharon said that the workings are looking fine and that everything indicates the presence of a big body of ore in the neighborhood. A drift will be run to strike the ore 30 feet below the 1650, and every indication favors the likelihood of striking it at that point. If such proves the case, the presence of an ore body of magnitude will be proved. The prospect is the next best thing to a certainty.

It was reported that the Con. Virginia ore on the 1650 level is to be tapped at two other points, 50 feet above and 50 below the present workings. For that purpose a south drift is being run, according to hearsay, from a raise, 50 feet up, in the direction of the ore. A west crosscut on the 1700 level, which was stopped in the neighborhood of the ore a couple of years ago, has also been cleaned out and is now being continued west toward the point where the ore is expected to come down from the 1650 level.

People who are acquainted with the country in question are confident that both workings will tap the ore. In case this happens, a very strong effect upon the market may be expected.

The workings from the Rule drift are reported to be looking better all the time, and a body of ore may be discovered there at any time.

Regarding the Con. Cal. & Virginia, the Enterprise further says in relation to the showing in that mine: "Colonel S. T. Curtis and Colonel E. D. Boyle were included in a party of experts who inspected the new ore development on the 1650 level of Consolidated California & Virginia mine yesterday. Colonel Curtis took numerous samples from the face and side of the drift on the 1650 level and from that 14 feet below.

"The ore is heavily impregnated with black sulphurets and is precisely the same character as that found in the bonanza of 1874. Colonel Curtis says that every feature of the new discovery indicates that it will make into an extensive body of high-grade ore. He says it lies to the west of a wide belt of low-grade ore, which had never been prospected heretofore, and he is of the opinion that it will show still stronger at a greater depth.

"He stated that the new ground in which the discovery is located is of ample area to include within its boundaries an ore body of a value only exceeded by the development in the mine of 1874. 'They have nearly 400 feet of ground between the 1650 and water levels, and I will be disappointed if this discovery does not prove to be fully as important as that of 1886,' said the Colonel.

"There is a large area of new ground to the north, west and south of the present workings, and this discovery is only the forerunner of a more important development.

"Colonel Boyle corroborated the statement of Colonel Curtis in every detail, and is even more deeply impressed with the importance of the new discovery. A practical miner, who was included in the party of inspection, and whose judgment is relied upon as being infallible, coincided with the opinions of Colonels Curtis and Boyle.

"It was later learned that Superintendent Kinkead was included in the party of experts. Mr. Kinkead says there is about 18 feet of ore now exposed in the drift 14 feet below the 1650 level, and that the crosscut to be run 28 feet below the 1650 level is sure to cut the downward continuation of the ore body, which it will reach in about ten days. He says the outlook for the development of a large body is very promising, and that it is a long distance west of the old slopes and in entirely new ground, and therefore there is no possibility of encountering either old timbers or an inflow of gas."

Still later that paper says: From authentic and reliable sources it is ascertained that the rumor prevalent yesterday throughout the day to the effect that an important strike had been made in the Rule drift was without foundation. Work is steadily progressing, with bright prospects; rock giving low assays.

At the annual meeting of the stockholders of the Justice Mining Company, 93,245 shares were represented, and the following officers elected for the ensuing year: Aug. Waterman, president; H. Zedig, vice-president; and P. Amiraux, E. P. Barrett and S. Jacobs, directors. R. E. Kelly was re-elected secretary, and R. P. Keating superintendent. The superintendent's report showed the mine to be in a good condition. A grade of ore is being extracted which runs three-quarters in gold and one-quarter in silver. A test run of about 250 tons of ore which has been extracted from the various openings at present is being made at the Taylor mill and with very satisfactory results.

In the Occidental they continue to extract about eight tons of ore per week, of an average of \$41 per ton. During April 110 tons and slimes produced hulsion valued at \$1384.

In the Kentucky the south drift from the east crosscut on the 1035 level is in 16 feet; the face is in ore of fair quality. On the 1200 level the south drift from the Jacket incline is in a total distance of 69 feet; face in low-grade gold ore.

Nevada mining assessments falling due in May aggregate \$77,500.

Osceola District.

OSCEOLA HYDRAULIC DIGGINGS.—Enterprise: Hydraulic mining has started up at the Osceola in eastern Nevada on a grand scale. The Osceola gravel deposit is the largest and richest in the State—the largest in all the Great Basin region. The Osceola placers are nugget producers. Already many fine nuggets have been found—the largest weighing 24 pounds—and hardly a beginning has been made on the gravel deposit. This season they will have an almost unlimited supply of water, and we may look for fine re-

sults. The placer is of local origin, and it is known that the gold comes from the quartz veins above, on the slope of Jeff Davis peak. Little has been done with any of these veins. In the process of washing with the hydraulic other rich veins may be uncovered. No doubt the vein which is the producer of the big nuggets will eventually be found. As the gravel yields a paying amount of fine gold, the nuggets found from time to time come in as clear gain—a little golden godsend.

When the company shall have worked out their gravel deposit they may find good use for their water supply in driving water mills for the reduction of their quartz veins. Doubtless more gold remains in these than is found strewn below in the gravel that has resulted from the disintegration of the croppings. It is a region of great—of golden possibilities.

In the vicinity of Osceola are dry washings that are paying big wages. There is a great gold range running from the Osceola, down through the country toward Ferguson district. It is a good region in which to prospect. In such a belt the chances for finding paying parallel veins are always good. About Ferguson are also rich gold veins, and doubtless others of value remain to be discovered. Indeed, a gold belt seems to extend more or less regularly all down through the eastern borders of Nevada to the Colorado river. This region is attracting many Utah, Colorado and Montana mining men. Big prices are being paid for some recently-discovered mines.

Soda Springs District.

SODA SPRINGS DISTRICT.—Reno Gazette: So far eleven gold-bearing mines have been discovered in Soda Springs district, Esmeralda county, on the line of the Carson & Colorado Railroad, 50 miles south of Hawthorne. One ledge five feet wide has been uncovered that shows plenty of \$200 rock; another, four feet wide, shows up a big body of \$40 ore; and still another five-foot ledge that assays \$70 per ton. What is termed as the "waste rock" assays \$20 per ton. The district as a whole will average anywhere from \$20 to \$70 per ton.

Ferguson District.

PROSPECTING FOR WATER.—Pioche Record: Prospecting for water with a 1000-foot drill is one of the things that Captain J. R. de Lamar will undertake at Ferguson as soon as machinery for that purpose can be shipped in. This method has been successfully followed in a number of cases around Denver, Col. If a subterranean water channel can be located by this means—and there is reason to believe it may—the water question, and with it a good part of Ferguson district's future with regard to a disposition of its ores, will be settled.

ARIZONA.

Prescott Courier: James Howey and Peter Marx returned yesterday from A. W. Callen's Placita camp, where Mr. Howey has been testing a dry washer of his own invention, and found the same to work more successfully than anticipated. He brought in a vial of very nice-looking gold dust, the result of the experiment. He found that one man at the crank would keep another man fully occupied feeding screened dirt in the machine. The ground tested belongs to A. W. Callen and is being worked by Mexicans, who pack the dirt a mile to water and pan it out. One Mexican recently obtained an ounce of gold from a sack of dirt, while another Mexican a short time before that got from the same ground a \$50 gold nugget, which he sold at the Congress. Prospects can be found in every pan of dirt taken from this ground.

The sale of the Bullard mine is reported, the price being \$400,000. This mine is situated about ten miles south of the Santa Maria mines, being in the same mineral belt. There is said to be several million dollars' worth of ore in sight in this mine.

The richest gold mine ever struck in Yuma county was found last week, two miles south of the Monitor placer mines near Gila City. The vein is situated in the rugged range of mountains known as the Gila range, clear up in the summit in a canyon 60 feet deep, which the vein crosses. On the summit the vein is eight feet wide; in the bottom of the canyon, 600 feet below, it is 20 feet wide. The whole body of the ore prospects rich, while portions of it show very fine specimens of free gold.

BRITISH COLUMBIA.

More than 1200 claims have been located in the Slocan mining district since its discovery.

The Grant-Omaha Smelting Company will erect reduction works in the Kootenai. The site is not known yet, but will likely be at Three Forks or Nakusp.

The forces on several of the leading Slocan properties have been increased recently, the owners having full confidence in the future.

Residents of the Kootenai district are agitating for the establishment of a mint in Canada, and also that the government will buy only Canadian silver when they want more white metal coin.

The Big Bend gold country, about 60 miles above Revelstoke, is attracting attention this spring. A townsite has been staked out, and it looks as though there would be quite an influx of prospectors in June.

IN LITIGATION.—Spokane Review: A controlling interest in the Noble Five group of mines in the Slocan country is being negotiated with an Eastern syndicate, the price being reported at \$300,000. The group is one of the richest in British Columbia, having already shipped 400 tons of ore, which, it is claimed, yielded 150 ounces of silver and 69 per cent lead per ton. There is 700 feet of tunnel in three divisions already on the property. The width of the vein varies from 2½ to 6 feet, although in one place it is much wider, as in an upraise 9 feet of solid ore were encountered. A two-fifths interest in the claims is in litigation.

tion. Dr. Hendryx and Captain Hayward claim an interest with William and John Hennessey, under a grub-stake contract. The trial will be held at Vancouver, June 1st.

IDAHO.

THE POORMAN MINE.—Idaho *Avalanche*: The company's mill started up for "business" last Saturday, after a successful trial run, and is now running steadily and satisfactorily. The mill is equipped with stamps, table plates and Frue vanners, and so far, after thorough tests and assays, it has been demonstrated that the loss in milling is but trifling—a very small percent. Heretofore the method used on the ores of this property, as well as on all the War Eagle mines, has been the amalgamating process, or a series of pans and settlers. The cost of milling under the old process is expensive and unsatisfactory, requiring a large expenditure for power, chemicals and quicksilver, and saving but about 60 per cent of the value. The cost of milling has always been from \$10 to \$12 per ton, where, under the concentrating plan, the cost is reduced to \$2 to \$5 per ton, and the loss is practically nothing. Ore is being hauled from the Oso ore house now, and a force of miners is at work in the stopes, taking out ore. The npraise connecting the Belle Peck and Oso tunnels will be pushed as fast as practicable. A large ore house will be erected at the mouth of the Belle Peck.

BOOM LOOKED FOR.—The Lewiston *Teller* says: This will be a great year for mining prospectors. Nearly every paper you pick up has an item concerning a new party fitting out for the search of placer or quartz mining. A Spokane daily of recent date tells of a party fitting out to go placer mining on Selmon river this season. Others are going on the same errand. There is no doubt that the bars of the Salmon will yield handsome returns to the miner who works them, and it would be no surprise if tales of fabulous wealth could be truthfully told about some locations before the season is over. There is plenty of gold in the bars along the Salmon river. Such is the assertion of all who have prospected there.

MONTANA.

A FIFTY THOUSAND DOLLAR SALE.—*Inter-Mountain*: H. L. Frank has just closed a deal with the Anaconda Mining Company for the sale of several mining interests, for which he received \$52,500 cash. He sold a one-eighth interest in the Nepa, one-half of the Clerk Fraction, one-fourth of the Alexander and all of the Parrot No. 5. Some time ago the McGinnleys sold their interest in the Alexander for \$22,000 and Shelly Tittle sold one-half of the Clark Fraction for \$8000.

ANACONDA.—*Standard*: The new converter at the lower works was started up last Saturday. The building, which is iron throughout, is 380 feet long by 125 feet wide and contains 24 converters, with a capacity of turning out every month no less than 10,000,000 pounds of copper. It is fitted with all the latest improvements, including such new features as electric traveling cranes, hydraulic cylinders for blowing engines, and, in fact, everything that goes to make the finest plant, installed with the very newest inventions and improvements, that has ever been built. The new institution will give employment to 120 men. In a year from now this one building will have probably turned out enough of the dark yellow metal to furnish every one in the United States with a copper kettle, besides filling innumerable kettles of residents of this city with the necessities of life.

OREGON.

THE PYX MINE.—At the Pyx mine, situated about 40 miles southwest of Baker City, the force is constructing the milling plant and expect to be able to complete the work inside of a month. The plant will be started up with five stamps, but five more will be added July 1st. There are between 200 and 300 tons of ore on the dump and its estimated value is placed at \$40 per ton. The Pyx is developed by two tunnels. The upper is in 650 feet, giving a depth of 50 feet. In the face of this tunnel is exposed a five-foot free-gold vein. The lower tunnel is 200 feet long and gives a depth of 90 feet.

GOLDEN EAGLE MINE.—The amalgam resulting from the test run of 85 tons of rock from the Golden Eagle mine, on Applegate, was refined at Ashland last week by G. W. Johnson, and produced a handsome gold brick, weighing 963 ounces, worth \$1603.95. The ore was taken from a prospect shaft sunk from the croppings of the ledge to a depth of about 30 feet, and was hauled about 14 miles to the mill of Anderson & Holyoke for crushing. The mine is one of the few in Oregon which has paid for opening and working from the top down, and gives every evidence of being permanent.

GRANT COUNTY.—*Long Creek Eagle*: During the past winter some little work has been quietly prosecuted in the quartz mines near Susanville. Mr. John Hughes has put in most of the winter extracting ore from his property, which he will treat in his arastre. Mr. G. S. L. Smith has been working a force of men most of the winter on his Princess lode. He has been extending the drifts from the old workings, prospecting new ground, and, we understand, with satisfactory success. The Centennial Mining Co. have been doing some prospecting work, under the direction of Messrs. Stevenson, Scott and Smith, on their Oregon lode, and extracting ore which they will practically test in their arastre. Messrs. Sloan and Haskell have begun the cleaning out of ditches preparatory to resuming operations on their well-equipped Elk Creek property.

NEW MEXICO.

COCHITI.—The new Cochiti mining camp, which is causing considerable excitement throughout New Mexico, is about 40 miles north of Albuquerque, and is in Bemalillo

county. Wallis is the nearest railroad station, which is 13 miles from Allerton, the largest town in the new camp, although there are several town sites laid off. Two or three have stores, restaurants and saloons. The mineral belt seems to be narrow, and the formation is porphyry or belongs to the porphyry family. The belt is both aniferous and argentiferous. The mountains, though steep, are not inaccessible. The camp is what is called by prospectors a blind camp, with a few exceptions where large quartz ledges crop out boldly, and in some cases stand 20 feet above the soil.

Most of the mineral-bearing rock in place seems to be either capped with trap rock or covered with slide rock.

The mountains are covered with splendid mining timber, plenty of it large enough for saw timber, and plenty of water in the main canyons.

The course of the mineral belt is very nearly north and south.

The most prominent mines yet opened are the Lone Star, which has a quartz ledge 27 feet wide. Assay returns show it to be a profitable smelting ore; it runs well in both gold and silver, as do several other quartz ledges.

The Iron King lode has a large quartz ledge and is an extension of the Lone Star. The Crown Point lode is another quartz ledge, which has just shipped a carload of ore milling \$100 per ton; one mile from the Crown Point another lead is located, known as the Washington mine, a quartz ledge from 20 to 30 feet wide which has pay ore in abundance. Still farther to the west is the Whale, also located on a quartz ledge 30 feet wide. To the northeast is the Man's Delusion lode, one of the largest quartz leads in camp, which is said to run well. The course of these leads is about north and south.

The ore of the camp is probably petzite, although that can only be determined by a chemical test, as the only thing that resembles ore in the quartz is a bluish cloud here and there.

SOUTH DAKOTA.

TO TEST THE PROCESS.—*Deadwood Pioneer*: Prof. Uhlenberg, assayer for the Homestake Mining Company, left for Denver recently to investigate the merits of the bromine process as improved by Prof. Englehardt. Mr. Uhlenberg will demonstrate the practicability of the process upon half a ton of Homestake concentrates which he will have shipped to the Englehardt mill.

UTAH.

THE IREX MINE SOLD.—The sale of the Irex mine in the Detroit district, twenty-five miles west of Deseret, is reported by the *Salt Lake Tribune*, the consideration being \$150,000. The mine is considered one of the valuable gold and copper properties in this district. The purchasers are the Copper Plant Company, and it is stated a smelter will be built. The Irex has 25,000 tons of ore in sight, which, judging from recent assays, will run at least \$26 to the ton in gold.

A BINOMAH TRANSFER.—*Salt Lake Tribune*: The final arrangements for the taking up of the bond on the Stewart mine at Bingham have been made, and the property is now in the hands of the Egan syndicate. The bond called for \$150,000. Of this amount \$110,000 has been paid and the remainder is due in one year. The property was originally owned by Salsburg & Gilmer, and was bonded by T. Egan, E. D. Egan and Jnd Bates, who are now the owners. The mine is one of the greatest gold mines in the country. The ore body is, in places, 200 feet wide, and there is estimated to be 700,000 tons of ore in sight. The ore is free gold, and averages about \$9.20 to the ton. There are five Huntington mills on the property, with a daily capacity of about 60 tons. The mill saves about 75 per cent of the gold in the ore. The mill has been in operation about six months, and over \$100,000 has been taken out in gold.

THE IREX SOLD.—*Tribune*: The sale of the Irex mine in the Detroit district, 25 miles west of Deseret, is reported, the consideration being \$150,000. The mine was owned by Allen G. Campbell, S. F. Mount and H. Holbrook, and is considered one of the most valuable gold and copper properties in the district. The purchasers are the Copper Plant Company, and it is stated on the best authority that arrangements are now being perfected for the erection of a smelter at that point. The Irex has 25,000 tons of ore in sight, which, judging from recent assays, will run at least \$26 to the ton in gold.

BINOMAH: SALE OF THE STEWART.—*Herald*: The sale of the Stewart mine at Bingham to the Bingham Mining Co. is perfected. The mine brought \$150,000. There seemed to be a chance that the deal would not go through, the recent negotiations looking to the sale of the property to an Eastern English syndicate for \$300,000 having been declared off. In explanation of the small amount for which the mine was sold, the statement is made that the bond and lease were executed when the property was undeveloped and before the successful method of treating the ores was discovered. The mine was not nearly so valuable then as now, and the former owners—the members of the Stewart Mining Co.—considered that he was receiving a fair price for the mine, which is now considered to be one of the most valuable in the Territory. It is turning out between \$10,000 and \$16,000 in gold bullion every month, and the amount of ore in sight is said to be something marvelous. The rock averages \$9.20 to the ton, and the present method of treatment is saving 95 per cent of the precious metal at a cost of about \$2 per ton.

—The first train passed over the new railway line between San Francisco and San Luis Obispo last Saturday. The newly completed road opens up some splendid country.

Coast Industrial Notes.

—The California-street Cable Company has paid a dividend of 50 cents per share.

—The Edison Light and Power Company will pay a dividend of 66 2/3 cents per share on the 15th.

—The Alaska Packers' Association has declared dividend No. 5 of 75 cents per share, payable to-day.

—The California Electric Light Company has declared a dividend of 15 cents per share, payable next Tuesday.

—Foreign-made bags that have been sent out of the United States with grain in them and have been returned must pay duty the second time. So decides the Collector of the Port.

—The men employed in the Le Roi mine, about 20 in number, struck recently for \$3.50 a day and nine hours' work. The mine is on Trail creek, British Columbia, and is owned in Spokane. The owners declined to accede to the demand.

—The woods crew of the Pacific Lumber Company at Scotia, Humboldt county, numberlog 60 men, have struck for an increase of wages, demanding the same pay that other institutions are paying. The matter has been arbitrated successfully.

—The April lumber exports from Humboldt county were about half a million feet in excess of those for the previous month, but were 3,000,000 feet less than those for the corresponding month of last year, and nearly 6,000,000 feet less than those for April, 1892.

—The British ship Somaui recently arrived from Hongkong with 2500 tons of coal brought originally from Tonquin to Hongkong at a cost of \$2 per ton. It cost about as much more to get it across the Pacific, and the duty was seventy-five cents per ton. San Francisco is long on coal just now, and \$1 a ton was what the lot sold at last Saturday.

—The Ideal Placer Mining Water and Power Co. of this city, which owns about 400 acres of gold-bearing gravel near Camanche, proposes to tap the Mokelumne at Italian Bar, sixteen miles above Wallace, and carry water in a six-foot pipe, tapering to a two-foot pipe at Lodi, the idea being to supply 20,000 inches of water for mining and irrigation purposes.

—L. C. Dillman of Spokane, Wash., has proposed to the Tacoma Chamber of Commerce that it have all the unemployed men now marching on to Washington taken to Tacoma, fitted out and set to work digging three irrigating canals across the State, the men employed to be fed and clothed and their expenses paid, and their wages paid in interest-bearing bonds, secured by land along the ditches.

—The Board of Directors of the Turlock, Cal., Irrigation District Company let the contract for the completion of the entire canal, including tunnels, headgates, drops, lateral canals, etc., on the 4th inst. to Doe, Hunt & Co. of San Francisco. This will open up 176,000 acres of land to irrigation between the Tuolumne and Merced rivers in Stanislaus and Merced counties. The mammoth rubble masonry dam near La Grange, which is the highest overflow dam in the world for diverting water, was completed last December.

—The use of a chemical battery in supplying the electric current in telegraphy has been the sole means of supply so long that it was deemed impracticable to substitute a more direct form; but F. P. Medina of this city, a native Californian, has devised a dynamo that distributes electro-motive force direct, dispensing with the customary cup battery. The machine is in position in the office of the Postal Telegraph Company on Market street and furnishes the current to a quadruplex and twelve Morse wires. The inventor calls it a "multipotential dynamo." It is the result of five years of study and experiment and if successful, as it appears to be, will revolutionize that part of the world's telegraphic service.

—A new idea in loading lumber has been recently put in successful operation on this coast. Where sawmills are located near open roadsteads, difficulty has been experienced in loading lumber. The wire system obviates all that. The vessel is anchored, and picks up a wire attached to a buoy cable, by another wire being fastened at the top of the cliff. The water end of that wire is picked up by a boat and put aboard, when the two wires are joined, the slack made taut, a "traveler" slung on and the lumber sent down in slings, swiftly and easily, from the mill to the vessel's deck. The Point Arena wire is 900 feet long. The plan is a great thing for the formerly isolated mills along the rocky coast.

Patents Issued to Pacific Coast Inventors.

Reported by Dewey & Co., Pioneer Patent Solicitors for Pacific Coast, 220 Market Street.

FOR WEEK ENDING MAY 1, 1894.

519,223.—MARKING BRUSH.—R. G. Bailey, S. F.
519,226.—POWER WHEEL.—A. Blenkowski, S. F.
519,230.—SWITCH.—Brackelsburg & Edwards, Portland, Or.
519,235.—PALE HANDLE.—F. M. Buck, Spokane, Wash.
519,936.—FLOW.—Burkhardt & Smith, Dayton, Wash.
519,016.—ELECTRIC STRAP.—R. M. Clairmont, S. F.
519,240.—METAL PUNCH.—T. E. Clark, Cleora, Or.
519,241.—BOILER.—Collier & Dignard, Lakeport, Cal.
519,254.—PIPE WRENCH.—J. Geissendorfer, Walmer, Cal.
519,182.—SHEET METAL TUBES.—J. Gould, Jr., S. F.
519,114.—ELEVATOR.—C. I. Hall, S. F.
519,129.—SMITHING ORBS.—H. Lane, Tacoma, Wash.
519,022.—CAR COUPLING.—J. W. Lang, Los Angeles, Cal.
519,197.—MOWER.—R. McGeaney, Walla Walla, Wash.
519,206.—CAN HEAD SOLDERING MACHINE.—W. H. Smyth, S. F.
519,010.—SURVEYING INSTRUMENT.—W. R. Whipple, Portland, Or.

Notices of Recent Patents.

Among the patents recently obtained through Dewey & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

FOUNTAIN MARKING BRUSH.—R. G. Bailey of San Francisco, Cal. One-half assigned to J. F. Halloran and Alfred Holman. No. 519,223. Dated May 1, 1894. The object of this invention is to provide a marking brush with a fountain attachment by which a proper supply of marking fluid is conveyed to the brush, and a means by which the material is prevented from becoming clogged within the passages, and a means for attaching an ordinary brush and replacing the latter when necessary. It consists of a tubular shank or handle, with means by which it may be filled with the marking fluid. At the lower end is a brush-holder screw-threaded to fit upon the end of the handle, made conical and having a conical valve which closes against the inner part to prevent the escape of marking fluid when the device is not in use. This valve has a flattened blade which extends through the narrow passage in the valve seat, and the upper end or shank of the brush fits into the enlarged chamber below this opening, leaving a space on each side for the liquid to flow down into the brush. The whole of this part is encased with a conical covering which tapers down so that only the brush appears below it. When the device is to be used, the brush-holder is given a slight turn which unscrews it a little from the handle, and this raises the valve to allow the marking fluid to pass. At the same time the blade at the end of the valve, turning around in the passage, clears the latter from any sediment and leaves it free for the flow of the marking fluid.

POWER WHEEL.—A. Blenkowski. No. 519,226. May 1, 1894. The object of this invention is to provide a wheel having vanes or fans which are adapted to turn or feather at certain points in the revolution of the shaft, so that at one portion of the revolution the vanes are presented with their faces in the direction of revolution, and at another part with their edges in this direction. This device is applicable either to be used as a wind or water wheel to which power is applied to revolve it, or it may be used as a fan to produce a blast by applying power thereto. The rotating shaft has radial vanes projecting therefrom with journal pins upon which they are allowed to turn about their axes. Independent stationary segments are fixed upon opposite sides of the shaft and partially enclose the same. The ends of these segments approach each other toward a central point so as to impinge upon the hubs of the vanes and rotate the latter by frictional contact while the shaft turns to carry the vanes successively between these segments.

Board Sales of Mining Stocks.

S. F. Stock Board.

THURSDAY, May 10, 1894.

9:30 A. M. SESSION.

600 Alpha.....	35c	1000 Exchange.....	150c
200	35c	100	14c
100 Alta.....	50c	300 G & O.....	1.65
200	52c	300	1.70
300 Andes.....	1.05	700 Julia.....	1.70
250 Belcher.....	2.00	500 Justice.....	.40c
200	2.05	50 .....	.38c
500 Bodie.....	3.95	800 Kentucky.....	.20c
100	4.00	100 L Wash.....	.9c
150	3.90	650 Mono.....	.15c
400 Best & Belcher.....	2.90	600 Mexican.....	.26c
900	2.95	450 .....	.25
50 Bonanza.....	2.50	145 .....	.24
450	2.50	200 Occidental.....	.15c
200 Bullion.....	.60	450 Opbir.....	.51
1000 Bulwer.....	.25	600 .....	.52
700 .....	.25	100 .....	.54
300 .....	.27	600 Overman.....	.55c
400 Caladonia.....	.30c	300 Potosi.....	1.55
500 .....	.31c	1150	1.60
500 Challenge.....	1.00	450 Savage.....	1.15
100 .....	.95	300 Scorpion.....	.14c
300	1.00	750 Sierra Nevada.....	1.70
1050 C. O. & Va.....	.81	100 .....	.14
790 .....	.80	600 S Hill.....	.7c
1150 .....	.54	500 Union.....	1.35
150 .....	.50	300 Opbir.....	.15c
100 Crown Point.....	1.15	500 Yellow Jacket.....	1.35
600	1.20	100 Opbir.....	1.30
400 E Sierra Nev.....	.5c		

2:30 P. M. SESSION.

300 Alpha.....	35c	300	1.00
950 .....	.37c	800 Exchange.....	.13
400 Alta.....	.54c	200 E Sierra Nev.....	.5c
250 .....	.55c	100 G & O.....	1.55
400 Andes.....	1.05	300 .....	.14
100	1.05	1000 Seg Belcher.....	.15c
650	1.80	250 Mexican.....	.245
500 B & B.....	2.50	100 Mono.....	.75c
150	2.50	100 Occidental.....	.18c
100	2.70	300 Opbir.....	.15c
250 Bodie.....	3.75	400 Overman.....	.54
250	3.70	1200 Potosi.....	1.40
550 Bullion.....	.60c	400 Savage.....	1.10
500 Bulwer.....	.30c	50	1.15
300 .....	.32c	100 Seg Belcher.....	1.5c
100 .....	.33c	200 Scorpion.....	.15c
100 Caladonia.....	.30c	300 Silver Hill.....	.6c
200 Chollar.....	.85c	50 Sierra Nevada.....	1.60
100 .....	.90c	250 Opbir.....	1.55
2050 Con. Cal & Va.....	.97c	750 Union.....	1.35
500 C N Y.....	1.20	400	1.20
100	1.30	200 Utah.....	.20c
150 Crown Point.....	1.05	300 Yellow Jacket.....	1.20

Market Reports.

The Markets.

SAN FRANCISCO, May 10, 1894.

Amid the flutterings in the silver market the fact appears manifest that it has reached its lowest figure, and that from now on it will steadily, if slowly, appreciate.

The foreign copper market continues languid, owing to the over supply, unaccompanied by active demand, which tends to depress home prices. Lead follows silver in its fluctuations. Quicksilver is higher, at \$36 per flask.

Last week's notable advance in the price of commercial-bar silver is ascribed to the demand in India, China and Japan. The determination of Germany and France to coin more silver tended to stiffen the market. The decline in the latter part of the week is accounted for by the reaction consequent upon the adjournment of the London Bimetallic League meeting without definite action.

During April 2391 flasks of quicksilver were received here; the receipts for April, 1893, and April, 1892, were 1467 and 1856, respectively. The receipts for the first four months of this year are 9703 flasks. The exports for the same time were as follows:

	Flasks.	Value.
New York.....	3,000	\$ 92,000
Hongkong.....	2,000	53,973
New Zealand.....	10	300
Central America.....	404	12,020
Mexico.....	1,435	42,488
British Columbia.....	38	1,219
Canada.....	200	5,306

Total.....	7,087	\$207,306
In 1893.....	7,385	298,291

Assistant United States Treasurer Jackson at San Francisco reports cash on hand April 30, 1894, as follows:

United States notes.....	\$23,207 00
Treasury notes 1890.....	12 965 00
National Bank notes.....	47,910 00
Gold certificates.....	4,700 00
Silver certificates.....	83,820 00
Gold coin.....	11,577,743 00
Standard Silver Dollars.....	24,773,477 00
Subsidiary Silver coin.....	943 026 55
Minor coin.....	20,431 91
Fractional currency.....	10 50

Total.....	\$37,493 290 96
------------	-----------------

Standard Dollars shipped in April .. \$99 500 00
Fractional coin shipped in April.... 49,100 00

The local bullion, money and exchange quotations current are as follows:

Commercial Loans, per cent per annum.....	7@8
Commercial Loans, prime.....	6@9
Call Loans, gilt-edged.....	7@8
Call Loans, mixed securities.....	7@8
Mortgages, prime, taxes paid by tender.....	7
New York Sight Draft.....	12 1/2 c
New York Telegraphic Transfer.....	15c
London Bankers', 60 days.....	\$4 88 1/2
London Merchants.....	\$4 86 1/2
London Sight Bankers'.....	\$4 89 1/2
Refined Silver, per ounce.....	63 1/2
Mexican Dollars, nominal.....	51 1/2 @ 52

New York Prices.

NEW YORK, May 10.—Following are the closing prices for the week:

	Silver in—	Copper.	Lead.	Tin.
Thursday.....	29 1/2	64 1/2	.....	.....
Friday.....	29	63 1/2	9 50	3 20 19 60
Saturday.....	29	63 1/2	9 45	3 20
Monday.....	29 1/2	63 1/2
Tuesday.....	29 1/2	63 1/2	9 60	3 25 19 50
Wednesday.....	29	63 1/2

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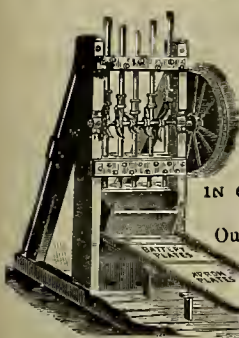
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MINING SHAREHOLDERS' DIRECTORY.

COMPILED EVERY THURSDAY FROM ADVERTISEMENTS IN THE MINING AND SCIENTIFIC PRESS AND OTHER S. F. JOURNALS

ASSESSMENTS.

COMPANY AND LOCATION.	No. AMT. LEVIED.	DELINQ. AND SALE.	SECRETARY.
Best & Belcher M Co, Nevada.....	250.....	April 30, June 5, June 20.....	L O Osborn, 309 Montgomery
Bodie Cons M Co, California.....	17.....	Mar 10, April 18, May 14.....	M E Willis, 414 California
Challenge Cons M Co, Nev.....	16.....	Mar 10, May 23, May 29.....	O L McCoy, Mills Bldg
Chollar M Co, Nevada.....	33.....	Mar 21, Apr 24, May 16.....	Chas E Elliot, Nev Block
Clifton Cons G M Co, Cal.....	110.....	April 23, May 23, June 10.....	O C Harvey, 389 Montgomery
Crown Point G & S M Co, Nev.....	3.....	Jan 10, May 18, June 6.....	Otto tum Sudet, 216 Bush
East Sierra Nevada M Co, Nevada.....	8.....	April 11, May 12, June 2.....	Jaber Howe, 214 Pine
Eclipse Mining Co, Cal.....	10.....	Mar 23, May 10, May 21.....	C D Bennett
El Leopoldo C & S M Co, Mexico.....	6.....	March 27, May 5, May 24.....	J Scott & C, 320 Sansome
Evening Star M Co, Cal.....	35.....	April 23, May 26, June 19.....	O C Harvey, 389 Montgomery
Golden Prize M Co, Nev.....	105.....	May 1, June 5, June 23.....	A B Thompson, 309 Montgomery
Gray Eagle M Co, Cal.....	2.....	April 23, June 1, June 13.....	O E Kelly, 213 Sansome
Hale & Norcross M Co, Nevada.....	9.....	May 3, June 14, July 3.....	Aug Waterman, 309 Montgomery
Hazard G M Co, California.....	62.....	May 4, June 6, June 26.....	E B Holmes, 319 Montgomery
Kentuck Cons M Co, Cal.....	2.....	April 2, May 7, May 23.....	R R Grayson, 331 Pine
Ophir M Co, Nevada.....	4.....	April 13, May 19, June 9.....	C A Hare, Pier 5
Osborn Hill M Co, Cal.....	10.....	May 2, June 11, July 9.....	J W Pew, 310 Pine
Pine Hill G & S M Co, Cal.....	2.....	April 10, May 12, May 31.....	F H Andross, 324 Pine
Silver King M Co, Arizona.....	.....	.....	.....
West Cons. Cal. & Va., Nevada.....	.....	.....	.....

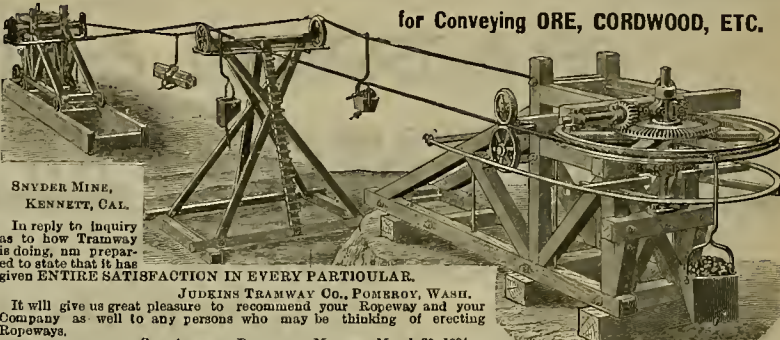
MEETINGS.

COMPANY AND LOCATION.	MEETING. SECRETARY AND OFFICE IN S. F.	DATE.
Christy M Co.....	Annual.....Geo R Spencey, 310 Pine.....	May 21
East Sierra M Co.....	Annual.....Geo R Spencey, 310 Pine.....	May 14
Scorpion M Co.....	Annual.....	May 17

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for Conveying ORE, CORDWOOD, ETC.



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In reply to inquiry as to how Tramway is doing, nm prepared to state that it has given ENTIRE SATISFACTION IN EVERY PARTICULAR.

It will give us great pleasure to recommend your Ropeway and your Company as well to any persons who may be thinking of erecting Ropeways.

SAN ANDRES, DURANGO, MEXICO, March 20, 1894.

I desire by this letter to testify, that the Vulcan Wire Ropeway furnished to this company by your Works, and erected by your engineer, B. McIntire, is of the very best class, and has given us entire satisfaction since its installation.

ANTONIO H. PAREDES, Director S. A. de la S. M. Co.

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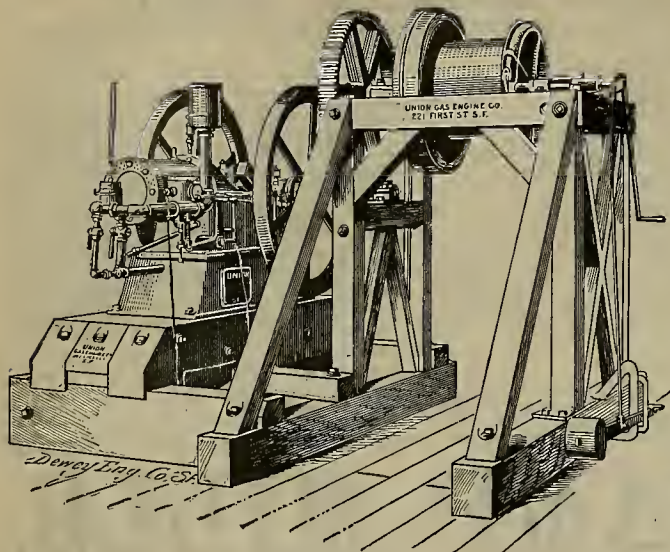
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Engines for Mining Purposes a Specialty.

WARNING! If you are in need of power for mining purposes investigate this engine and take no other. Many so-called gasoline engines are now on the market, which are direct infringements of our patents and it is our intention to bring suit against the various infringers. As the law holds the purchaser, as well as the manufacturer, we would advise parties who have already purchased other gasoline engines to obtain from the sellers of such engines a good and sufficient bond protecting themselves in case damages are obtained against them, as it is not the policy of this company to work a hardship on innocent parties, but the law makes no such provision.

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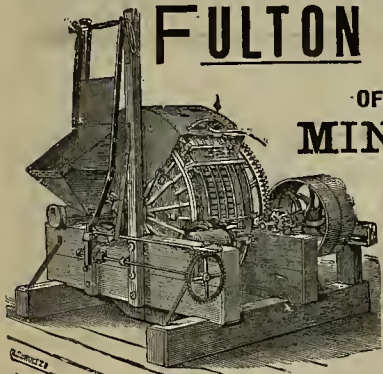
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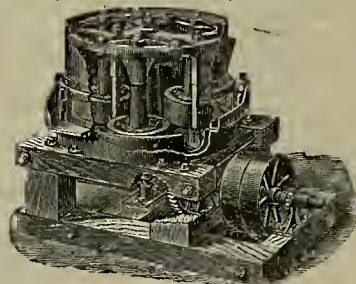
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An Illustrated Journal of Mining, Mechanics and Popular Science.

VOLUME LXVIII.
Number 20.

SAN FRANCISCO, SATURDAY, MAY 19, 1894.

Three Dollars per Annum.
SINGLE COPIES, 10 CENTS.

Vertical Compound Engine.

Engineers and the public at the present time seem divided in their preferences between two types of engines—the slow speed and the high speed, in the various forms which have recently come so largely into use.

Since the beginning of the rivalry between the two classes of engines, there has been a recognized place for an engine which possesses some of the undisputed advantages of the high speed type, in the direction of rotation, floor space and regulation.

The recent advent of electrical dynamos, arranged to be placed directly on the engine shaft, has greatly emphasized the want above described, because of the great saving in cost of dynamos when higher rotative speeds are employed, and the desirability also of close regulation.

With increased rotative speed shorter stroke is permissible, and hence the vertical form of engine offers many advantages.

The engine built by the Ball & Wood Company, Elizabethport, New Jersey, herewith illustrated, has many favorable characteristics in economy, rotative speed, regulation, cut-off valve gear, small floor space, adaptation for driving direct-connected dynamos and desirability for mill work.

The governing mechanism of an engine must be of special interest to the student of valve gears. Beginning with a well-known form of shaft governor, the principles of which have attracted the attention and admiration of the ablest engineers of the day, the superb regulation thus obtained is made effective by transmitting the necessary motions to the cut-off valves through a special wrist-plate device, in which a compound motion is obtained, and the cut-off valves at all points of cut-off operate relatively to the main valves just as though the latter were standing still, thus preventing wire drawing of steam at any point of cut-off.

The location of the valves in the cylinder head, giving

as it does the shortest possible ports, permits of their being of ample capacity without an appreciable increase of clearance.

The peculiar motion of the cut-off valve utilizes these wide ports to the fullest possible extent, and the cut-off motion at every point from zero to three-quarter stroke is a rapid one, in fact as rapid as is obtained from the re

Recent Specimens Sent to the Mining Bureau.

At the State Mining Bureau there has recently been received a collection of matted iron crystals, each one hollow, found 200 feet below the surface in Cochise county, Arizona. Apparently the crystals were formed first, and then coated with iron by nature's slow and sub-

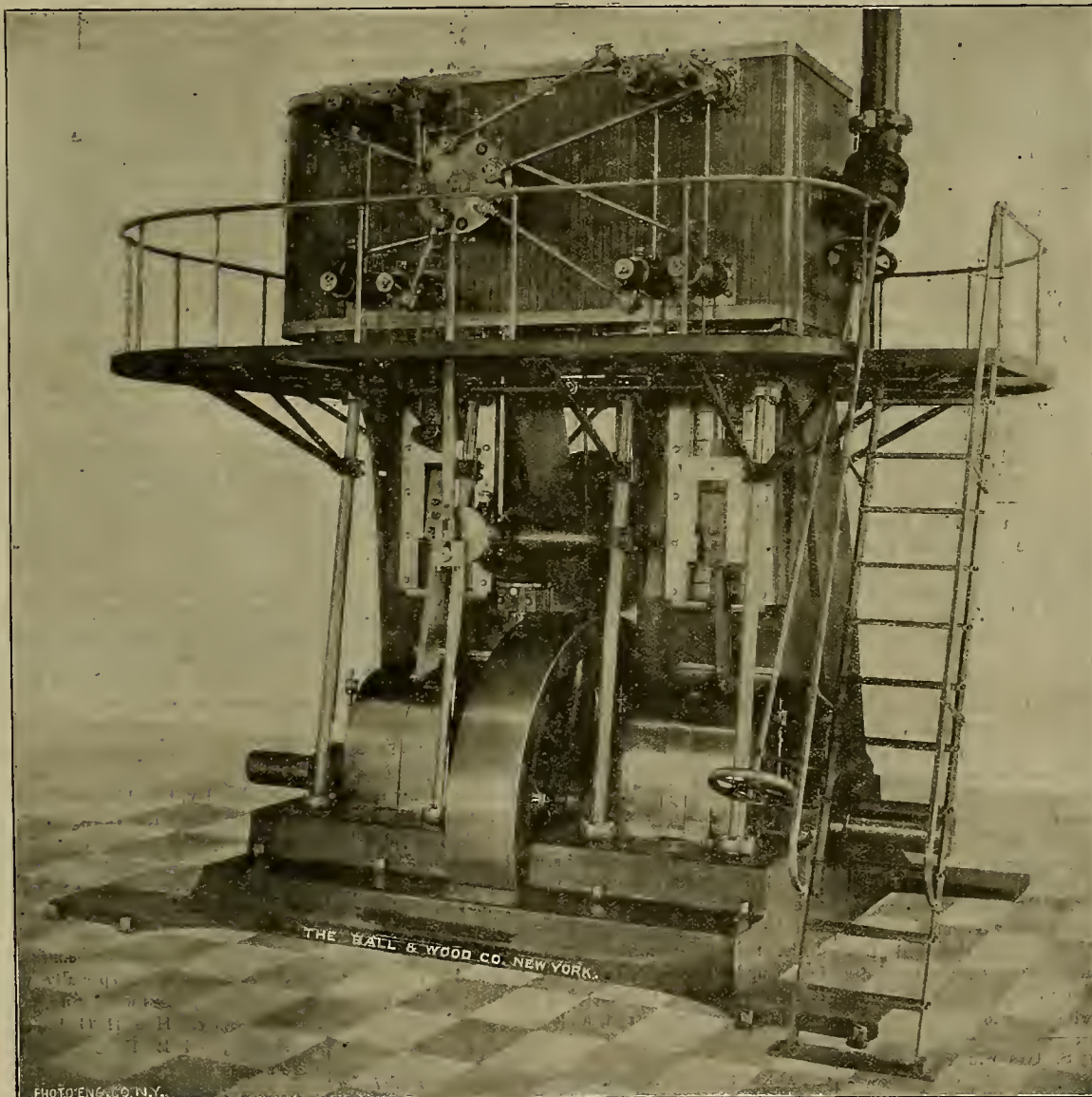
tle alchemy. From La Perouse, Australia, has come a six-sided sandstone column, unlike anything ever before seen in this State. A fine sample of mica comes from Kamloops, British Columbia, that is reported to be in quantities sufficient to make it merchantable. The New Almaden mercury mines also send some splendid cinabar specimens from a recently discovered lead in those famous mines, exceedingly rich in quicksilver. Several fine specimens of gold quartz from the White River District, Tulare county, have been sent in. It is not generally known that Wells-Fargo all over the coast will transport free of charge anything of a mineral character weighing twenty pounds or less to the Mining Bureau in this city.

THE prevalent impression is that the Midwinter Fair concessionaires have been having a hard time of it; but the official government figures tell a different story. The customs duties alone on goods sold at the Fair to the 1st

amount to over eighteen thousand dollars, showing that over \$100,000 worth was sold. There has also been a large amount sold on which duty had been paid at the Chicago Fair. Besides, large quantities of merchandise have been sold by sample. The facts are in opposition to the plaint of the exhibitors.

THE Oxe movement is being worked for all it is worth by sending undesirable citizens back from whence they came.

At the end of 1892 the proportion of gold to silver was 15½ to 1. At the present time it is 35 to 1.



NEW TYPE OF VERTICAL COMPOUND ENGINE.

leasing gear, because of the higher rotative speed of the engine.

THE extraction of Comstock ore through the Suto tunnel is again being discussed. That is what the tunnel was for, but the bulk of the bonanza had gone up the mouths of the shafts before the big bore was finished. 'Tis now nearly sixteen years since the tunnel was connected at the 1640 level of the Savage incline.

THE present extraordinary low rate of interest is illustrative of the abundance of idle money and the depression of trade.

MINING AND SCIENTIFIC PRESS.

Office, 220 Market Street, Northeast corner Front, San Francisco.
 ☞ Take the Elevator, No. 12 Front St. ☞

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Per line (agate).....	\$ 25	\$.50	\$ 1.20	\$ 4.00
Half inch (1 square).....	1.00	2.50	6.50	22.00
One inch.....	1.50	5.00	13.00	42.00

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Assessment Notices.....	\$10.00
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Large advertisements at favorable rates. Special or reading notices, legal advertisements, notices appearing in extraordinary type or in particular parts of the paper, at special rates. Four insertions are rated in a month.	

Our latest forms go to press on Thursday evening.

Entered at the S. F. Postoffice as Second-Class Mail Matter.

San Francisco, May 19, 1894.

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RECENT quotations of aluminum place the retail price in plates from \$1 to \$1.50. In ingots it sells at 80 cents, and in bars for horseshoes, forgings, etc., at \$2 a pound.

IN the interests of "economy," it is proposed to disorganize the Coast and Geodetic Survey. Such pranks are on a par with the "economy" of the idiot who burns down a costly structure.

THE effort at "tariff legislation" has become simply a contest among the different trusts and combines, a battle of the lobbyists, each trying to get all possible favor. It has become "a local issue."

SELDOM has a greater contrast been afforded between actual and assumed assets than in the case of the Pacific Bank of this city. When last examined by the Bank Commissioners their report was that the assets were \$4,774,758, and the liabilities \$2,884,157. Now it transpires that the liabilities continue at that figure while the assets have shrunk to \$2,902,338.

THE substitution of oil as fuel in the locomotives of the C., B. and Q. railway system is a noticeable movement. For some time an English railway has been using a fuel composed of gas, tar, creosote, coal dust and sawdust, but the Chicago, Burlington and Quincy affords, it is believed, the first instance of a prominent railway company resorting to oil exclusively for locomotive fuel.

THE town of Fairchance, Pennsylvania, seems to be misnamed. Working miners at Fairchance, whose only crime is a desire to labor that their wives and children may have bread, have been dragged from their beds, tied to posts and whipped by some of their former comrades who believe that their objection to labor gives them the right to punish any one else who wants to work.

THE recent death of Henry S. Ives illustrates a good many things. Twelve years ago he was working on a farm for two dollars a week. Then he got eight dollars a week as a New York office boy. When twenty-one he was getting fifteen dollars a week. He went on Wall street and made \$30,000 the first year. The next year he had secured \$2,000,000; the next he had worked the street for \$21,000,000. He died at 80.

THE Spokane Review doesn't like the Montana Miners' Union, and says: "If men are idle in the Cœur d'Alenes, it is because they will not work in these times of depressed prices for less wages than they were paid when silver was up to \$1 and \$1.20 an ounce. The great ore bodies of that section could employ 4000 men and pay them from \$2 to \$3 per day, but they cannot employ 400 men at \$3.50 per day. The Butte Miners' Union is alone responsible for the hard times now suffered by the people of the Cœur

d'Alenes, and indirectly by all the people of this section. In its mad fight against the impossible, it has caused labor to lose millions without one compensating cent. The strike there for impossible wages has hardly a parallel for stubbornness of folly. It is absolutely destitute of reason."

REGARDING the recent Supreme Court decision in the case of King vs. the Amy and Silversmith Consolidated Mining Company, a rehearing of which was asked, it is understood that the rehearing will be denied. The supposable ground for such declination is the undeniable fact that the court interpreted the law as it exists. Probably were the judges members of the other co-ordinate branch of government and empowered to make the laws they might be able to frame a statute that would not be so prolific of litigation.

THE American manufacture of tin plate is not in the languishing condition sometimes ascribed to it. During the three months ending December 31, 1893, thirty-nine firms manufactured 27,351,241 pounds of tin andterne plates; for the preceding three months the output by the same firms totaled 27,145,480 pounds. About sixty per cent of this was made from sheets rolled in the United States; of the firms twenty used wholly American plates, eleven American and foreign plates, and four used foreign plates exclusively.

FROM Boulder county, Colorado, comes details of "a new process" to treat low-grade gold ores. A series of filterers take the ore from the stamps, the ore coming in at the top, and gauged by water pipes running in, the free gold being caught in the first filter, the remainder being concentrated in the second. It is claimed that by a peculiar construction of the filterers a receiver saves 95 per cent of the gold without plates or chemicals. The process has been patented, and, if there is any merit in it will make a name for itself.

THE last lecture of the winter course of the Geographical Society of the Pacific was given last Tuesday evening by Hugh Oraig, the subject being "Reminiscences of New Zealand." The lecturer referred to the Maoris and their refusal to accept Anglo-Saxon civilization, and gave an interesting account of the Maori mythology, showing how closely it follows the Mosaic account of the creation and the flood, and other Biblical narrative. "The singular thing is," said Mr. Craig, "where did they get it, for they had no written records? This question has puzzled philosophers and learned men."

THE Executive Committee of the State Mining Exhibit at the Midwinter Fair have issued a final appeal to mine-owners everywhere throughout the State for aid in carrying on the exhibit till the close of the Exposition. As at present, the finances will be used up by June 1st. It would be a pity to close the exhibit during the last month of the Fair, but money is necessary to care for, pack and return the exhibits, and the request of the committee in charge is so manifestly reasonable and just, it is so clearly in the interests of all, that it is believed the matter need but be mentioned to elicit satisfactory response from all concerned.

THE Midwinter Fair drilling contest, under the auspices of the Mining Department, will take place at 3 o'clock next Tuesday afternoon. It is open to any miner on this coast. There is a prize of \$100 for the best single-hand driller; \$200 for best team of two drillers; \$300 for best team of three drillers, and second prizes of \$50, \$100 and \$150, respectively. The time for drilling will be fifteen minutes; all drills used by teams of two and three will be seven-eighths steel; drills used by single-hand drillers to be five-eighths steel; hammers not to exceed four pounds in weight; the work to be down holes in Rocklin granite. Considerable interest is manifested; there are numerous entries, and it is manifest that the best men will win.

TALKING of silver and exchange, the *Times of India* looks for a big falling off in shipments of silver to India. "In future," says that paper, "silver will scarcely be imported except for the purposes of art, hoarding, bartering and possibly for illicit coining. The quantity that will be absorbed in the arts can hardly be large enough to interfere seriously with the sale of council bills. As a bar of silver weighs nearly 85 pounds, it cannot be taken to an up-country railway station without attracting attention, so it will not suit the party intending to bury it underground to expose his wealth to his neighbors. It may be asked why he should not have his bar cut into pieces before taking it away from the Presidency town. The reply is that a bar which is cut up when put on the market fetches less than an entire bar; and as by settlement regulation the bar must be of nearly 2300 tolas, the purchaser cannot resell at a considerable profit if this metal is cornered."

"Hoarding, bartering and illicit coining" sound singular, but are illustrative of some of silver's uses in that far-off land.

IN a few days 40 mining men will leave this city, under the leadership of A. R. Hammond, for Central Africa on a prospecting tour. They comprise all necessary attaches, and plan to spend three years in Central Africa. They call themselves the South African Prospecting and Exploring Expedition. Each member must pay his fare and have \$500 besides for an outfit. They expect to go fully equipped, even to taking a small stamp mill, and propose to go where no white man has ever trod. J. O. Sissons is the assayer and Richard Lewis the geologist.

THE Idaho *Avalanche* says that the new milling process is of inestimable value to the War Eagle miners, and that the Poorman Consolidated are now milling their ore at a cost of about \$2 a ton, and saving everything. It gives the gain between the old process and the new, taking 100 tons of \$100 ore as a basis under both processes:

OLD PROCESS.	
100 tons @ \$100, assay value.....	\$10,000
Value saved, 80 per cent.....	\$8,000
Milling @ \$13 per ton.....	1,300
Net to mine-owner.....	\$6,700
NEW PROCESS.	
100 tons @ \$100, assay value.....	\$10,000
Value saved, 98 per cent.....	\$9,800
Milling @ \$5 per ton.....	500
Net to mine-owner.....	\$9,300
A difference of \$2600.	

A MINING SUIT is being at present conducted in the United States Circuit Court in this city of considerable interest to the mining public. The litigants are the Consolidated Gold Mining Company and the Champion Mining Company. The property in dispute is located on Deer creek, Nevada county, Cal., and is valued at from half a million to a million dollars. The Wyoming people claim that the defendants have, during a number of years, taken out about 50,000 tons of ore from veins asserted to be the property of the plaintiff, and ask for the value of the ore, and for an injunction against the further working of the vein in question by the defendants. The claim of the plaintiffs is denied in toto by the defendants, who assert that the plaintiffs have no extra lateral rights, and that they are working their own property in the extraction of the ore in the ground in dispute. The suit is in equity, and will take some time to determine.

Visit to the Union Iron Works.

Secretary of the Navy Herbert and a party of invited gentlemen were the guests of the Union Iron Works last Tuesday. The tug Fearless brought the Secretary and his party down from Mare Island accompanied by the Fifth Artillery Regiment Band from the Presidio. Upon arrival at the Union Iron Works the entire party disembarked. Mr. Henry T. Scott showed the distinguished visitors through the works. They were taken on board the Olympia, which the Secretary of the Navy examined with considerable interest and commendation, having many things to say of the Union Iron Works and the work being done there, which were commendatory and deserved.

Nevada at the Fair.

Last Tuesday, the 15th, was "Nevada Day" at the Midwinter Fair in this city. It was a fine occasion, finely celebrated by thousands of present and former residents of the Silver State. Nevada is the only State having its own building on the grounds, and it was at first intended to have the literary part of the celebration in the building, but the thronging thousands made that impossible, so all outdoors was utilized. Speeches were made by distinguished citizens, music specially written for the occasion was performed, songs were sung, and there was a good time generally. Hon. H. G. Blaisdell, the first Governor of Nevada, and R. K. Colcord, the present Governor, were among the speakers. In the course of his remarks Gov. Colcord said:

Nevada may be said to be a child of California, as the greater part of its earlier settlers were Californians, and, like the pioneers of '49, they were of the best material, and braved the many hardships and privations in crossing the mountains of perpetual snow and entered what was then a sagebrush desert inhabited only by hostile Indians. Their work in the development of our mines was phenomenal, and for 30 years our people enjoyed a wonderful degree of prosperity. Our miners and laboring men received a higher rate of wages than was ever before paid for the same class of labor in this or any other country. During this time our mines yielded nearly \$600,000,000 in gold and silver bullion, which we think a very fair showing for a State having a population of about one-seventh that of the city of San Francisco. In common with all other silver mining communities, our mining interests are now suffering in consequence of adverse, and, we think, unwise legislation, which will be corrected when the American people decide to dispense with the services of selfish, partisan politicians, who serve their masters, and elect in their stead honest, able, patriotic American statesmen, who will labor for the best interests of America and Americans rather than for foreign capitalists.

General Mining Notes.

THE Con. Virginia works are now lit by incandescent electric lights.

AN English syndicate is forming to work alleged gold mines in Devonshire, England.

JAS. L. FLOON has acquired control of the Allison Ranch mine, near Grass Valley.

W. C. HADLEY of Albuquerque, N. M., has bought the Tennessee mine at Chloride, Ariz.

THE Rand mines, limited, South Africa, contributed one-sixth of the world's gold product last year.

THE Old Glory gold mine near Tucson, Ariz., is to be refitted throughout and worked for all that is in it.

It is thought that during the present month the Anaconda mine will produce 13,000,000 pounds of copper.

THE "Maggie G" mine in the Black Mountain District, Colorado, is reported sold to El Paso parties for \$160,000.

THE Washoe mine near Butte, Mont., was sold at referee's sale last week for \$50,000.50. J. A. Legget is the purchaser.

J. E. NICHOLS of San Jose has control of the Centennial gravel mine in Nevada county and will resume operations and push work ahead.

THE James G. Blaine Mining Company has been incorporated to develop mining properties in the White Horse mining district, in Washoe county, Nevada.

WITH sixty stamps the output of the Robinson Gold Mining Company of Johannesburg, South Africa, for twenty-eight days was \$150,000 over all expenses.

THE Reno Reduction Works have been leased by Russell, Bradley, Foley & Co. for six months. It is the intention to work 5000 or 6000 tons of the English mill tailings at the works.

THE latest shipment from the Tillie Butzel mine, at Boulder, Col., yielded the owner over \$450 per ton. Twelve men during the month of April raised ore which netted the owners over \$5000.

NATHAN MILLARD and three companions of Campo, Col., have perished miserably on the Cocopah desert, in San Diego county, where they were making an ounce a day when they died of thirst and exposure.

WEE HON PEUNK, once a millionaire Chinese miner in Arizona, and again heard of in South Africa, where he went with his American wife to make another fortune, has bought an interest in the Kaaraji diamond mine.

THE largest bullion shipment ever made from Park City, Utah, occurred on the 8th inst., there being 105 bars, containing 92,323 34 fine ounces. The *Record* says the express car was full of it and it attracted general attention.

THE Baldy Queen Mining and Smelting Company has organized at Trinidad, Col., with a capital stock of \$70,000. This corporation has several claims in the Moreno district, in New Mexico, among them being the Grand View.

THE dead body of John L. Tinnian, an old Colorado miner, was found near Grand Junction, Colo., last Monday. It is thought that he was murdered and robbed. His brother was formerly Surveyor of Port of San Francisco.

JAMES O'BRIEN, an employe in the Anaconda mine at Butte, Mont., had a very narrow escape from death last week. He stepped into an open shaft and fell 100 feet. He received many painful bruises and was badly cut, but his hurts were not fatal.

W. E. LINDBER, the locator of the travertine ledge in Mono county, has sold the quarry to a party of capitalists, who propose to ship the travertine to all parts of the United States and Europe. They say the discovery is one of the most important ever made.

THE average wages in the Johannesburg, South Africa, mines are reported to be as follows: Miners, working machine drill, per day \$5; miners, working Kaffirs, \$3.75; blacksmiths and good drill emitts, \$5; fitters, from \$4 to \$5; engine drivers, from \$3.75 to \$4.75. Engine drivers average from \$120 to \$150 per month of thirty days, chiefly twelve-hour shifts.

PROF. PRICE's experiments in smelting nickel (for the first time on this coast) have been successful. The first charge resulted in 200 pounds of metallic nickel, worth 50 cents per pound. The ore has heretofore been sent to England. It is from the Oregon nickel mine and can, it is believed, be treated successfully in this city.

WILLIAM PRINCE, an expert mining engineer, recently went to Bolivia in the employ of an English syndicate, to develop gold mines. While there he made a fortune on his own account. He lived alone at his mine, and it now transpires that he has been robbed and murdered by two men who stopped at his place ostensibly for a night's lodging.

It is reported that rich gold placer diggings have recently been discovered in the interior of the peninsula of Lower California. The placers are located eight miles east of the volcano springs, at a place called the Tules, and about 160 miles south-east of San Quintin. There is said to be plenty of water, and the miners are taking out from half an ounce to two ounces a day.

A CORRESPONDENT of the *Phillipsburg Mail*, writing from South Africa, says: "The only thing new now is a law which compels a prospector to get his claims surveyed within one month after locating; it only costs £50, and any prospector always has \$250 that he don't need. It is a great idea to have to pay that sum before one knows whether his ground is any good or not."

THE Alaska Treadwell Gold Mining Company announces the March cleanup as follows: Shipment of bullion, \$37,322; ore milled, 13,201 tons; sulphurets treated, 190 tons; of bullion there came from sulphurets \$5,464. The estimated gross expenses for the month have been \$21,388. The net profits available for dividends for the first ten months of the present financial year are about \$338,000.

AN exchange says that a rediscovery of the mine worked by De Soto and his followers 300 years ago has probably been found. W. C. Padget, a man who operates a sawmill in the mountains of Georgia, has discovered some relics in the shape of stone mortar and other implements. He secured the services of an old mining engineer to inspect the place. In one of the excavations they found the spur of a quartz vein, in which

there was a considerable quantity of gold. The old engineer said that it was a valuable find, and believes it is the exact spot where De Soto and his followers located and mined for gold and silver 300 years ago.

IN 1892 the quantity of gold exported from British Guiana was 131,425 ounces. So far the gold has been obtained by alluvial washing, but mining has now been started on quartz reefs in the northwest district, on the Barina, and also on the Demerara rivers. About half the output for 1893 was obtained from the district, comprising the Potaro river, which district alone gives employment to upward of 3000 men.

F. CHAPPELL, well known in Placer county, has bought a controlling interest in the El Encino mine in Chili Gulch, Calaveras Co., and is pushing a bedrock tunnel 1000 feet to tap the channel at the southern point of the claim; then, by extending the tunnel 900 feet up the channel, the bottom of the present pump shaft will be drained, thus again opening the Old Blue lead which paid so handsomely when water drove the miners out.

IN New South Wales there is a rush to the Wyalong gold fields. Another rush is reported to Coolgardie in West Australia. It is estimated that 20,000 men have gone to each place. Extraordinarily rich ore is found; but the majority will experience the usual disappointments. The Coolgardie gold fields are separated from settlements by over 200 miles of desert, destitute of water. Two miners who left Parramatta returned and showed 24 pounds of solid gold, 13 pieces in all, the nuggets varying from 37 ounces to 18 ounces, which were got out of the earth at Kurnalpi not more than a foot down. All the gold was picked up in four or five days.

A PARTY of capitalists have located four miles of the south fork of Clearwater for placer mining, commencing at the reservation line and running up stream. They propose to work the bed of the river by means of steam machinery, which forces a jet of steam from a bucket on the bedrock, and by means of another stream of cold air, condenses the vapor and thus creates a vacuum, which is filled by the sediment on the bedrock. The bucket is then hoisted and the contents are prevented from escaping by a valve. On arriving at the surface the gravel is washed by ordinary placer process. The machine is the invention of an old *Coeur d'Alene* named Walker, and was tested some years since on Feather river in California.

THE Tucson, Ariz., *Citizen* says: "The much desired free coinage of silver is somewhat after the Mexican plan. Every State has its own mint, or perhaps two or three of them, as in Chihuahua. The minting is done under the patronage of the Government, but by no means is the money minted by the Government. A London firm has the contract. The mints are to the American eye, and judging from the work turned out, ramshackle affairs. Thither the miner goes with his hurras laden with silver bricks. His silver is weighed and the money coined out for it. Or, as is often the case, should money be short, he waits a day or two for his grist to beground. Then he takes his new silver pesos and praises free coinage."

WHAT a pity it is, says the *Australian Mining Standard*, that some systematic effort is not made to give us the benefit of the cyanide process of treating tailings. There are immense quantities of tailings in different parts of the colonies that ought to pay well for treatment, and although we may not achieve anything like the wonderful results attained in South Africa, we ought to be able to recover an appreciable quantity of the gold which has been allowed to flow away owing to poorly equipped batteries or to special difficulties in the way of saving fine gold. The Witwatersrand mines are now getting nearly 40,000 ounces of gold per month from tailings, and some of the companies put through many thousands of tons of stuff every week and make a handsome thing out of the 50wt average return.

SUPERINTENDENT ABADIE reports concerning the North Star mine near Grass Valley that the ore crushed at the North Star mill contains about four per cent of sulphurets. Their average value is \$53.55 per ton, and they have yielded in seven years a total product of \$236,756.63. The concentrates are sold to the local chlorination works. From the concentrating machine the pulp escapes as tailings, containing more or less gold, notwithstanding a high percentage saved of the ore value (reaching 94 per cent under favorable conditions). At the present time there is in operation a simplex rotary amalgamator, treating ten tons of tailings per 24 hours. Results obtained thus far have reduced the loss in the tailings 32 cents per ton. The mill is operated entirely by water power, notwithstanding a high rate per available horse power; the cost of power per ton of ore crushed has not exceeded \$0.32. The water used has previously been utilized by the Original Empire Mill and Mining Company under a head of 450 feet. At the North Star the effective head is 273 feet at the mill. For the year just concluded, Mr. Abadie says the gross production of the mine foots up \$355,757.04. He shows that the cost of milling a ton of ore on the average for the past seven years has been \$0.816, of which \$0.323 was for labor, \$0.320 for power and \$0.168 for supplies.

Personal.

E. H. RUSSELL, of Park City, Utah, is in the city.

MAJOR POWELL has resigned as chief of the U. S. Geological Survey.

J. J. HALPIN, general manager Brunswick Mining Company is at Grass Valley.

JAS. BENALLACK has been re-elected superintendent of the Central North Star mine at Grass Valley.

THOS. CARLISLE, a well-known mining man has gone to southern Oregon to develop a newly opened mine.

JOHN ELY, who with "Uncle Billy Raymond" had so good a thing at Pioche, Nev., twenty years ago, is now in the Cochiti district, New Mexico.

EX-SUPERINTENDENT JOHN HANLY, of the Old Dominion mine, Stevens county, Washington, is now in Alaska, where he has struck it rich in a good mining property.

SECRETARY OF THE NAVY HERRERT has been visiting this vicinity for the past week. He recommends an additional dry dock at Mare Island. He was very complimentary to our local manufacturing. He is now in Portland, and after viewing the proposed naval station at Port Orchard, Wash., will return to Washington.

General News Notes.

THE Senate has shelved the Chinese treaty.

THE President's tariff bill still hangs fire in the Senate.

TO DATE 1,450,000 have been admitted to the Midwinter Fair.

THE Washington, D. C., association of '49ers had a picnic yesterday.

A NEW French company is being organized to complete the Panama canal.

A MILLION-DOLLAR FIRE destroyed Talmage's Brooklyn Tahernacle last Sunday.

LAST week's foreign shipments of gold from New York aggregated \$6,000,000.

THE little town of Forest City was almost totally destroyed by fire last Sunday morning.

ON Sundays and after 5 P. M. the admission to the Midwinter Fair is now twenty-five cents.

BLANN, of Missouri is being boomed for the presidential nomination on a silver platform.

LARGE numbers of counterfeit Wells-Fargo money orders are being circulated in the Eastern States.

FOERCASTER PAGEZ says that the State rainfall is being increased by tree planting, cultivation, etc.

THE revenues of the Government for the last ten months have fallen \$65,400,000 below its expenses.

SAN JOSE has spunkily and sensibly secured sentence for three years in the penitentiary for a bank wrecker.

AN incendiary fire in Boston last Tuesday night burned \$1,000,000 worth of property and left 2000 poor people homeless.

BUSINESS failures, with liabilities amounting to \$20,000,000, have occurred in Buenos Ayres since the 1st inst., and others are considered propable.

UNITED STATES SENATOR HUNTON of Pennsylvania was offered, and of course refused, seventy-five thousand dollars for his vote on the pending tariff bill.

ANOLPH SUTRO has fenced up the Cliff House and will charge 25 cents to see the seals. He will present Sutro Heights to the city of S. F. if a five-cent railroad fare is guaranteed.

WILLIAM B. COUP, charged with killing Z. Root in Long Canyon, two years ago, committed suicide in the Auburn jail last Wednesday by hanging himself with a handkerchief.

THE Bank Commissioners report less than \$70,000 on hand in the Pacific Bank. The claims against the bank aggregate \$600,000. The Commissioners hope to pay a five per cent dividend soon.

THE Appropriation Committee in the House of Representatives recommends a large appropriation to prior 10,000 copies of the record of the navy of the Confederate States during the Civil War of '61-'65.

SALT LAKE CITY has disposed of its famous gold-bearing bonds—interest and principal both payable in gold—at a premium of one per cent. The total issue, amounting to \$800,000, was bought by Chicago people.

THE San Francisco Custom-house is to be investigated. The notable falling off in the revenue on opium will be the principal thing investigated. At one time the duty amounted to \$1,400,000; it is now \$600,000.

THE number of Chinese registered in the entire country is 105,742, of whom 67,989 are in California and Nevada, 4701 in Montana, Idaho and Utah, and 1803 in Arizona. The Chinese population by the last census was 107,573.

LEN HAEIS, the Southern Pacific detective, was shot and mortally wounded at Boulder Creek, Cal., last Tuesday evening in the attempt to capture a desperado who had entered the railroad station at that point for the purpose of robbing it.

L. L. LEWIS, a Butte, Montana, mining superintendent, has been arrested in Chicago. Charles F. Stockes, proprietor of the Stockes Manufacturing Company, lost \$12,627 and a \$300 diamond at poker, while playing with him and three of his friends.

INVESTIGATION of the Northern Pacific road at New York shows sharp work on the part of Henry Villard et al. They bought a railroad whose capital stock was \$750,000, increased this to \$2,000,000, and sold it to the Northern Pacific for \$1,402,000.

CONCERTED action of the health officers of Illinois, Ohio, Wisconsin, Michigan and Indiana is depended upon to stamp small pox out of Chicago and the West. Extra physicians and extra inspectors are attacking the plague in the sweatshop districts.

OF 763 men in Kelly's industrial "army," 449 are American born and 314 foreign born. Of these 58 are from Germany, 30 from England, 28 from Ireland and 12 from Scotland. Politically 218 are Republican, 196 Democrats and 240 Populists, while nearly 100 were pinto.

ANOTHER private silver-dollar factory has been stopped at Kansas City. Missouri people are so fond of silver that in the absence of governmental ability to furnish the regularly stamped article, they accept a good imitation till Uncle Sam stops the surreptitious mintage thereof.

COXEY is spoken of by the London *Daily News* and the *Pall Mall Gazette* as an Ohio Congressman. He has been nominated by the Populists for Congress from the Eighteenth Ohio District. He says that his army will remain near Washington until Congress appropriates \$500,000,000 to furnish work for the unemployed.

THE report for April of the California State Board of Health announces a death rate in the State for that month of 1.25 per thousand, or 15 per thousand per annum. This percentage is based on reports from 86 towns aggregating a population of 893,453 and having a mortality for April of 1118. There were 210 deaths from consumption, 101 from pneumonia, 36 from bronchitis, 14 from congestion of the lungs, 8 from diarrhoea, 8 from cholera infantum, and 73 from other diseases of the stomach; cancer caused 31 deaths, and 96 were the result of diseases of the heart.

Loss of Gold in Milling Ore.

TO THE EDITOR:—The diversity of opinion existing in regard to the amount of gold loss in milling our ores at present is traceable to the tendency to generalize from special results on special ores. It does not follow with ores of widely different character that a heavy loss of gold in milling a special ore is proof positive of a similar result on all ores. The subject on hand presents few difficulties to arrive at correct results. We fortunately have excellent automatic sampling machines at present, which leave no uncertainty as to the fairness of assay samples of our tailings, and all it requires is for the millman to use the facilities on hand to get a true knowledge of the amount of his losses.

In 1873 the writer investigated the loss of gold in one of the best mills at the time existing in the State, and provided with efficient concentrating appliances, to incorporate the results in his report to U. S. Mining Commissioner, R. Raymond, on the "Treatment of Gold Bearing Ores in California." The samples were carefully taken at the end of the tail sluice as follows: The buckets were allowed to run nearly full every half hour, and the sands were settled exactly three minutes. The water, holding in suspension the slime and float gold, was filtered off on a large paper filter capable of holding the whole contents of the bucket. The coarser sands were filtered on a separate filter, sized

concentrates 25 per cent on the same rock. Messrs. McDermott and Duffield, in a pamphlet on "Losses in Gold Extraction," in criticizing our Government Reports in which former losses do not agree with later results, lose sight of the above facts. Hasty conclusions on insufficient grounds certainly detract from the value of their otherwise excellent monograph on the subject.

Not all of our ores, however, are as easily managed in milling as the ores of the Grass Valley and mother-lode series. This is especially the case with the gold ores occurring in the grano-diorite of the foothills, bearing a considerable amount of silver compounds. The difficulties of copper-plate amalgamation and thorough concentration are quite serious, occasioning a much heavier loss of the precious metals in milling and compelling the treatment of the resulting concentrates by smelting.

The practice of milling in Colorado appears to preclude the close working of its ores as evidenced by the results of former investigation by Mr. Reichenegger in his report to the U. S. Mining Commissioner in 1870, who notes a loss of 50 per cent of the gold, while Mr. Phil Argall of Denver, in his interesting discussion on paper read by T. A. Rickard before the International Engineering Congress, notes a present loss of 40 per cent in milling in Gilpin county—not a very encouraging gain in efficiency of the milling process during the last quarter of a century.

In regard to the most efficient weight of stamps referred

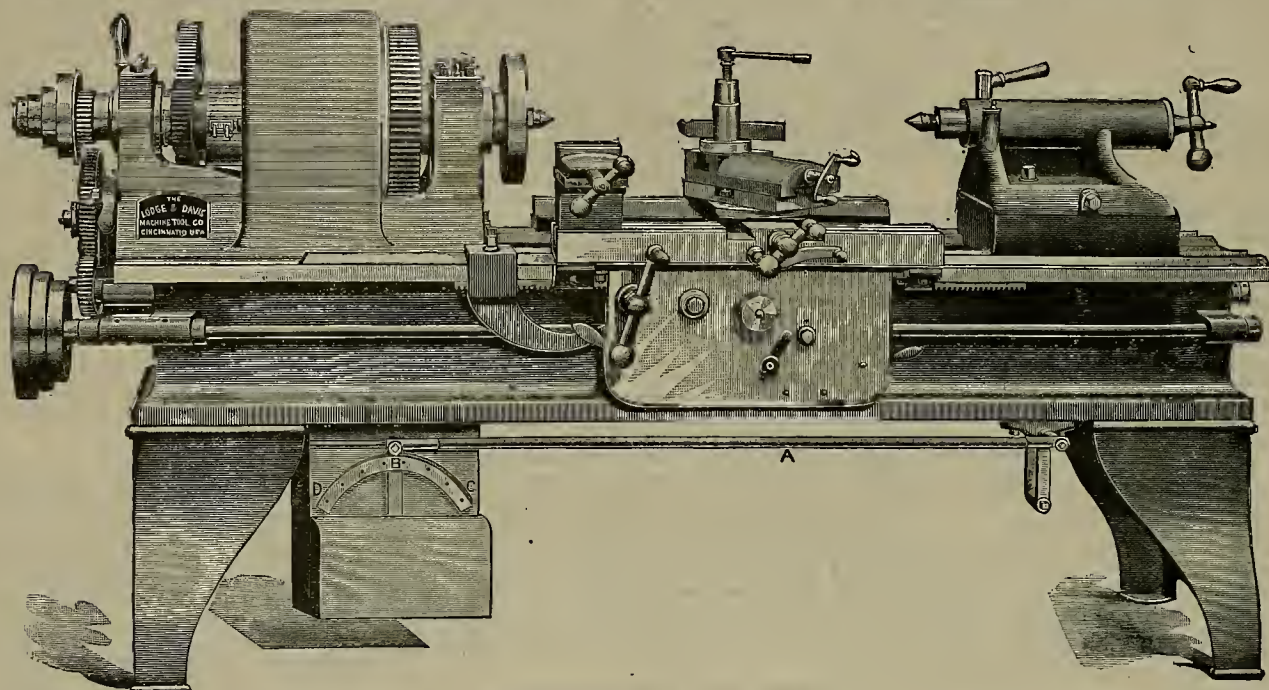
four women and two ten and twelve-year-old children, who will walk the long distance of 600 miles. The women wore men's trousers as well as the ordinary dress.

"Last year the miners got a good deal of gold," said Mr. Sylvester. "I know quite a number who cleaned up from \$5000 to \$8000 and \$10,000 each, and this has awakened an increased interest and caused those women to go in and join their husbands. The gold mines about Juneau, especially on Douglas island, are about as usual. The Treadwell is working 200 men. They are a little short of water there and are just now running a little lightly. The New Mexican Company, also on the island, has one 60 stamp mill just about completed and ready to start."

Motor-Driven Engine Lathe.

We present herewith an illustration of a lathe in which the design includes an electric motor, taking the place of the usual cone pulley. The lathe is reversed and the speed regulated by the movement of rod A, this, with the back gears arranged as usual, giving a much wider range of speeds than can be obtained by cone pulley, but a much more finely graduated speed; in fact, the speed may be anything from the highest to the lowest desired.

The armature of the motor is wound on a phosphor bronze spider with a carrier disk which revolves freely on a spider the same as a cone pulley.



MOTOR-DRIVEN ENGINE LATHE.

and separately assayed. The slimes containing the float gold represented 19 per cent of the solid contents of the mill water and showed a loss of three and one half per cent out of a total loss of twenty-seven per cent, or, with other words, about 13 per cent of the loss could be attributed to float gold. This result was obtained by crushing through a No. 6 punched Russian screen, the method of milling being at the time the blanket system.

Since the general introduction of battery amalgamation and broad oscillating amalgamated copper plates behind the apron plates, quicksilver and amalgam traps and concentrating machinery, the percentage saved in our mills has steadily increased, while the cost of milling by the introduction of grizzlies, rock breakers, self-feeders and automatic vanners has in similar ratio diminished. Mr. J. H. Hammond gives the present extraction of some of the best mills in his care after careful automatic sampling and assaying over a period of a year at from 86 to 90 per cent of the assay value, and there is no reason to doubt the correctness of his figures.

Superintendents of other gold mines in this State who keep a close watch on their mill losses by frequent sampling and assaying of the tailings—including all the solid contents of the mill water, not sands alone—report similar losses ranging from 10 to 15 per cent of the ore value at present.

The steady improvement in gold extraction in California is patent to all who were connected with the treatment of the concentrated sulphurets from the early days of quartz milling. The value of concentrated sulphurets, though cleaner or freer of quartz sands by true concentration than formerly, is continually decreasing on account of improvements in gold-saving appliances in front of concentrators. The writer knows of a case in which the introduction of a certain amalgamating device decreased at once the value of

to by an esteemed cotemporary in one of your late issues, the writer's experience at the Eureka mill, Grass Valley, in 1870, does not coincide with his view—that a 650-pound stamp is the right weight for milling our hard quartz.

The following facts will throw additional light on this subject: A battery of 20 stamps, weighing 850 pounds per stamp with 61 drops of ten inches per minute, crushed 48 tons of hard quartz in 24 hours, while a battery of 20 stamps weighing 700 pounds per stamp, with 68 drops of ten inches per minute, crushed 38.4 tons of the same rock through a No. 6 screen. The proportion of power necessary to do the work of the heavier to that of the lighter stamps is as 850x61, 700x68, and the work expected therefrom would be as nearly 42 tons from the heavy to 38.4 tons of the lighter stamps; but the former crushed 48 tons—an additional quantity of six tons in favor of the heavy stamps. However, it must be admitted that on softer rock, delivered in small size to the self-feeder and with other collateral conditions, the result may be more in favor of lighter stamps. Comparative tests generally impossible in the rush and hurry of milling practice should be a proper subject to the more leisurely investigation in field practice of the metallurgical faculty of our mining schools.

Auburn, May 16, 1894.

G. F. DEETKEN, M. E.

Women Going to Alaska.

Among the arrivals from Alaska yesterday, says the *Examiner* of the 17th, was E. O. Sylvester, proprietor of the *Alaska Herald* at Sitka and the *Journal* at Juneau. Mr. Sylvester says the far northwestern part of the continent seems to be the only section not affected by hard times. There is, in fact, unusual prosperity there, so he says. Already over 300 miners have passed in via Juneau for the gold mines up the Yukon, and among them were three or

It is surrounded by pole pieces inclosed in housing, the lower half of which is cast in one piece with head stock proper, to which the upper half is substantially fitted and secured by means of four bolts. This construction forms what is known as an ironclad motor, entirely free from external magnetism. This is necessary in order to keep small particles of steel and iron from adhering to the lathe, making it impossible to keep it clean.

Among the advantages secured by such an application of electricity are that tools may be placed independently of fixed conditions overhead, such as shafting, cranes, etc., and with regard to the arrangement best suited to handle the product most conveniently, and the operator has the best control of his machine, especially when a variable speed is necessary.

The head screw is placed on the inside of the bed, directly under the front V, and is inclosed in a brass tube, protecting it from dirt and chips. In this position it takes hold of the carriage directly under the line of strain, and obviates that twisting tendency which is so common in lathes where the screw is placed on the outside of the bed. All the feeds of the carriage can be thrown in and out or reversed from the front of the apron. This is a particularly desirable feature, inasmuch as the operator is not compelled to leave his work, and it does away with the complicated gearing in the head-stock. The carriage is provided with a stop which throws out the feed automatically, and may be set at any point along the ways. This is very convenient for turning or boring a given length, and also prevents the lathe from being damaged by any carelessness of the operator. The spindle is hollow and of large diameter; the boxes are made from the best phosphor bronze, and are provided for taking up wear.

This lathe was built by the Lodge & Davis Machine Tool Co., of Cincinnati, O.

The Limitations of the Gold Stamp Mill.

IN THREE PARTS—PART III.

Continued discussion of the paper of Mr. T. A. Rickard, read at the Chicago meeting of the American Institute of Mining Engineers, August, 1893.

In his criticism of my statement that the retention of the pulp within the mortar, long after it is pulverized to a fineness permitting exit through the screen, has been used by the Gilpin county millman to assist him in obtaining the conditions which he desires, Mr. Argall has missed the main principle, repeatedly emphasized by me, of the milling practice which he is discussing. The methods in vogue in Gilpin county originated in no idea of concentrating; if they had, then the excessive slitting of the pyrite, due to the deep discharge, would be a stupid blunder. On the contrary, however, the practice of the district is founded upon the principle of using the mortar, not only to crush the ore, but also, as far as possible, to make the mortar an amalgamating machine. The introduction of percussion tables for concentrating the pyrites in the tailings is comparatively recent. The millman's intention is to save as much gold as possible inside the battery, and to do this by retaining the pyrite (with which the gold is mainly associated) inside, until a separation has been brought about; and these ideas are carried out by having a roomy mortar, a long, slow drop, and a deep discharge—more especially the last, which assists in procuring the condition he considers the most favorable to his purpose.

A statement was made, more than once, at the Chicago meeting, which does not, however, appear in the printed discussion, namely, that while the California type of stamp mill has been introduced in mining regions all over the world, that of Gilpin county has not passed outside its own habitat. This statement is not quite accurate, since mills of the Colorado type have been successfully used in Dakota, Montana, Arizona and Idaho; but, broadly speaking, it is no doubt correct to say that the California type is, by far, the more widely employed. Upon this fact is founded the suggestion that the methods of "the little kingdom" of Gilpin are not thought worthy of imitation. In commenting upon this matter, I trust I may be absolved from any charge of prejudice, since I have used both types of mills successfully, and have endeavored to discuss the advantages and disadvantages of both fairly. The explanation of the fact just referred to is somewhat as follows:

The methods in vogue at Central City and Black Hawk were evolved under unusual conditions, and have been retained under peculiar circumstances. The first mills introduced, in the early "sixties," were modeled on the Californian type, and had a quick, short drop and a shallow discharge. While the mines were still in the gossan, or surface quartz, everything went well; but as soon as the unoxidized pyritic ores were reached the extraction began to diminish fast, and finally, this diminution nearly put a quietus to stamp milling. Then the smelter came to the rescue, and prevented the cessation of mining during the years which elapsed until the millmen, by a long series of experiments, arrived at the conclusion that a long, slow drop, and a deep discharge, gave the conditions most favorable to the successful treatment of their ores. When the present methods were adopted, nearly twenty-five years ago, there was no market for low-grade iron pyrites, and the ore, although containing from 10 to 25 per cent of sulphides, would give up a large percentage of its gold contents when crushed in the deep mortars which had come into use as the result of a hard-bought experience. The old methods have been retained, but with the addition of percussion tables, because now the smelters charge very low rates of treatment for pyritic concentrates. Smelting charges are \$4.50 for concentrates, and \$12 for crude ore. Railroad freight to-day (from Black Hawk to Denver) is \$1.50 per ton on material worth less than \$30 per ton, and \$2 per ton for higher-grade stuff. Small coal ("mine-coal") is delivered at the mills for \$1.60 per ton. These are some of the conditions which have tended to perpetuate a milling practice which is, in many respects, out of date.

On the other hand, the methods of Gilpin county have not been adopted extensively elsewhere, because it is rarely that ores rich in pyrites are found to be comparatively so free-milling. The Californian mill, moreover, in its typical form, is a crushing machine, adapted to preparing the ore cheaply and rapidly for a great variety of after-treatment, by plate amalgamation, blanket saving, pan amalgamation, concentration, lixiviation, etc. It is, as a crushing machine, having its parts so arranged as to give a maximum of automatic handling of the ore, that the California mill is first of its kind. Compared with it, in this respect, the Gilpin county batteries are clumsy and incomplete; but as an amalgamating contrivance for the treatment of a particular class of ore they were well conceived, at a time when amalgamating methods had no competitor in cheap smelting.

Thus, after all, we do but return to the truism, which is often forgotten in these generalizations, that the milling practice to be introduced at any mine or in any district must be suited to local conditions, the most important of which is, of course, the character of the ore.

W. L. AUSTIN, Denver, Colo.: A word as to the current fable of which Dr. Raymond speaks. Stamp stems being among the "working parts" of a mill are, therefore, included by Dr. Raymond in the category of the iron that does not crystallize. It will have been observed by any one who has operated a new stamp mill of the California type, with stamps dropping from 90 to 100 times per minute, that after his battery has been running 12 to 18 months the stamps stems begin to break. Moreover they break off, as a rule, right above the stamp head, though occasionally they snap off just under the tappet, and often it becomes a serious undertaking to remove the ends of the stamps from these heads or "hosses." On account of these breakages the stems are made tapering at both ends, so that when one end has broken off it can be reversed. In due course of time a similar mishap usually overtakes the other end. In many cases the mutilated stem is then laid aside as a problem for some future manager to solve, and new ones are ordered from the manufacturers. Now, the breakages may, as Dr. Raymond says, not be due to crystallization of the iron, for, properly speaking, the iron (which should be the best quality of wrought iron) originally used in their manufacture is crystallized to begin with, but during the pounding which the stamp has been doing, some molecular change has taken place, changing the fiber into a structure coarsely granular in appearance. That such a change should take place is quite conceivable, for these stems are submitted to an unpleasant amount of jarring. The $3\frac{1}{2}$ -inch stem weighs 363 pounds and the $3\frac{3}{4}$ -inch stem 390 pounds, while the aggregate weight of stamp, including stem, head, shoe and tappet, is over 850 pounds. Such a weight falling six inches 100 times a minute for 300 days in the year, finds no parallel case in pump rods or the connecting rods of engines. As would be expected, when the shoe is allowed to fall on the die the life of the stem is shortened. The fact remains that the stamp stems do break, and the iron has the appearance of being what, in the absence of a better term, is technically known as "crystallized." There is a class of men engaged in milling throughout the West who have been brought up in mills and have made a business of running them. It is a common practice among these operators to take the stamp stems out of the batteries and anneal them by heating, and hammering them when the limit of safe working has been reached. These men are not chemists, and had once their little foibles, among which was the harmless use of sage tea and similar concoctions in their amalgamation departments; but they are first-class, practical mechanics and their experience and opinions in these branches of milling are entitled to respectful consideration. Among such men as these the fable spoken of by Dr. Raymond is still current. At one mill which was under the writer's charge for a while, there was a man employed who was classified as mill blacksmith. He was the highest-priced man carried on the pay roll, and it was his special duty to repair the ironwork about the mill, anneal stamp stems, etc. Considering the appliances at his command he managed to perform what might be termed feats of blacksmithing, and among such was the piecing out and welding of $3\frac{3}{4}$ -inch stamp stems in an ordinary horse-shoeing forge, so that they afterward withstood the wear and tear of the battery. He always paid great attention to the careful annealing of such work, for it is the experience of millmen that stems thus treated last much longer than when such precaution is neglected. To have rendered this annealing necessary, the fiber of the iron must have undergone some change by the long-continued jarring which the stems had received. One can easily satisfy one's self of the extent of this jar by taking hold of a stamp stem while in operation. It will be found to quiver violently. If the molecular change which takes place among the particles of iron in a stamp stem after long and continuous use, by which the fibrous texture is altered into a granular one, may not be termed a crystallization, what is the proper expression to employ for such a phenomenon?

DR. RAYMOND: Mr. Austin's remarks indicate a misconception on his part of the meaning of my statements concerning the alleged "crystallization" of iron by vibration. It was not in the least my intention to quibble over a word. If I were so disposed, I should take exception to his present assertion that the wrought iron of which stamp stems are made is "crystallized," to begin with. The question in my mind, as I think a careful reading of my remarks will convince Mr. Austin, was, whether there is really a molecular change produced by vibration in wrought iron or steel. When Mr. Austin triumphantly inquires what is the proper expression, if "crystallization" is not, to describe such a molecular change, he simply begs

the question. It will be time enough to discuss the name when the existence of the phenomenon has been demonstrated.

Before considering the evidence as to that question adduced by Mr. Austin, I would recall that my own criticism was made upon the sweeping statement of Mr. Argall, that "vibration under all conditions will crystallize iron." This I pronounce to be, "beyond question, incorrect," and to this, my only unqualified assertion on the subject, Mr. Austin's argument does not apply. If his evidence proves anything, it proves only that iron is sometimes thus affected by vibration.

As to this more limited proposition, I must frankly say that I see no conclusive force in Mr. Austin's argument. The one fact upon which it rests is the breakage of stamp stems after 12 to 18 months' running, and the granular appearance of the fracture. But the fracture of a fresh bar of iron can be made to appear granular without any prolonged previous vibration, by the condition of the fracture itself. A granular fracture does not prove an altered structure. If the vibration theory were correct, the rest of the stamp stem ought to be more or less altered in structure; and, indeed, other parts of the stem ought to be more affected than the parts where the breakages usually take place, for the two places mentioned by Mr. Austin, namely, "right above the stamp head" and "just under the tappet," are precisely the points of minimum vibration. They are the points of maximum stress, due to the checking of vibration by the stamp head or the tappet.

Now, it probably never occurred to Mr. Austin, or any of the practical millmen on whom he relies, to find out whether the parts of the stem which vibrate most freely are molecularly changed by such vibration; but some experiments of this kind which have been made have revealed no such alteration.

The fracture of iron under repeated stresses, no single one of which will produce visible rupture, is a very different proposition, and does not necessarily involve molecular change. It is more probably due to minute ruptures between the particles of the metal, which finally aggregate to constitute visible fracture.

I cannot admit that the vibrations in a stamp mill are more severe or more likely to produce molecular change than those to which railway axles, marine shafts and locomotive connecting rods are subjected. In these departments, quite as much as in stamp mills, the notion of "crystallization" by vibration is an old one, and the evidence in its favor is essentially that which Mr. Austin adduces, namely, the granular appearance of fractures, which, taken by itself, is quite inadequate.

If vibration produces molecular change, why should previous annealing prevent that change? As it would be manifestly impossible for Mr. Austin's mill blacksmith to anneal the whole of a stem in a horse-shoeing forge, it must be that he annealed only the part which he had welded, which would be the very part out of which he had taken all effects of previous vibration. Such an annealing was very proper to remedy the unequal strains caused by the welding process itself, and to prevent the piece from breaking under stress or shock. But as it left untouched the rest of the "crystallized" stem, it can scarcely be considered regenerating a fibrous structure. Moreover, a fibrous structure cannot possibly be produced by annealing.

In short, while I have never denied the possibility of molecular change in iron due to vibration, I must continue to regard the proposition as unproved, and the burden of proof as resting upon those who assert it, in the face of numerous experiments and careful tests which indicate the contrary. Mr. Howe's conclusion, after a patient analysis of much evidence, is:

"To sum up, while vibration and shock often cause rupture under light stress, and while it is proverbially difficult to prove a negative, we have, I think, every reason to believe that the granulation and crystallization of iron under vibration and shock is a myth."

Unquestionably the notion of a mysterious change produced by vibration in the quality of iron has worked double harm in stamp-mill practice. On the one hand, it has been the convenient excuse of manufacturers, who declare the evidences of bad workmanship shown in fractures to be the result of subtle changes thus produced in originally sound pieces of good metal. On the other hand, mill engineers, believing that the inevitable vibration would break anyhow, in the course of a few months, the jarring parts of their mills, have given too little attention to the distribution of stresses and shocks by which such breakages might be greatly delayed or wholly prevented. If they would lay aside their preconceived notions, and, disregarding even the opinion of the mill blacksmith, study the mechanical reasons for the liability of a stamp stem to break just over the head or just under the tappet, I think they would find more significance in the way tappet and head are attached to the stem (so as to subject it to heavy side shocks at points where it is not made stronger than elsewhere) than in any amount of molecular speculation.

Chemical Theories About Formation of Nuggets.

By Arthur Lakes, in the Mining Industry and Tradesman.

In opposition to the mechanical theory of the origin of nuggets it has been urged that nuggets are often found very far away from any parent vein or reef. Their small size offering little surface for the pressure of water, combined with their great weight, would hardly allow water to carry them to such a distance, and in favor of the chemical theory. Gold in placers is sometimes found in iron pyrites, assuming the form of rootlets and replacing coaly matter, implying chemical action and solution, and that gold existed in ordinary waters and deposited with pyrite. Gold, it is maintained, is contained in mineral waters permeating rocks and placers, influencing the precipitation of gold, which concretes around certain substances congenial to it, such as other loose grains of gold, cubes of pyrite, etc.

Gold in solution has this tendency, for chloride of gold was decomposed by a piece of cork falling accidentally into the solution, and was precipitated around a small piece of metallic gold that happened to be present, greatly increasing its size. Similarly it has been found to concrete around a cube of pyrites. Gold crystals sometimes contain iron ore or iron pyrites as a "nucleus." From this it appears that organic matter will decompose a solution of gold and precipitate it around some nucleus offered to it.

As to the fact that placer gold is generally purer than vein gold, this, too, is in favor of the chemical theory, as it is found that gold may be greatly purified of its alloy by dissolving and reprecipitating it.

Nuggets may be formed and particles of gold may increase in size, through deposit of gold from waters percolating through the placer. And as at the time of volcanic eruptions, such as were prevalent at the time of the "placer" formation, as shown by the lava capping of the deep placers of California, these waters were both hot alkaline and saline, and therefore especially favorable to carrying gold in solution. Gold exists in some saline waters and has been detected in sea water, in the latter case probably derived from the rocks. Gold, too, was found in solution in the water of a mine in New Zealand.

Again, the pebbles of conglomerates are at times found cemented with iron ore containing gold, implying solution, and that the gold salt was in the same solution that deposited the pyrites. Gold has a great affinity for silver or quartz. Gold probably came into the gold vein in a solution of quartz or silver, the latter derived from the elements composing the adjacent rock, such as mica, hornblende and feldspar. Gold probably exists in minute form in these little minerals.

All native sulphides, such as copper and iron pyrites, are liable to contain both silver and gold. In the decomposition of a vein charged with such metals, silver may be oxidized away in solution, while the gold will be carried off in a very minute state. Gold being alloyed with silver, and silver with gold, shows that at the time of decomposition the separation was incomplete.

In illustration of some of these chemical changes going on in placers, is the occurrence of gold in the deep lava-capped placers of California. These placers are gravel drifts of ancient river beds, covered up by lava-flows 100 to 200 feet thick. The placers are worked by tunnels driven beneath the lava. Waters percolating through these lava-flows and reaching the gravels below are charged with alkali from the alkaline minerals composing the lava. These alkaline waters are also charged with silver from other elements of the lava. Hence the driftwood of these ancient river-beds has been silicified by these silicifying waters. The gravels are also cemented by silica. These waters contained iron also, and deposited iron pyrites around the fossil wood. The gold may have been in solution in iron sulphate, or else along with the iron in alkaline sulphide.

While the wood decayed it was partially replaced by quartz and partly by iron pyrites, the latter produced by deoxidation of iron sulphate by the woody organic matter. In this pyrite gold is found, sometimes in rounded grains and sometimes in minute crystals and threads, the latter just as in the pyrite of the decomposed quartz vein. This gold was deposited from a solution of iron at the moment of the reduction of the latter to a sulphide. Speaking of nuggets, one authority says that, "although gold exists in the iron pyrites of the unchanged vein only in minute, even microscopic, crystals and threads, yet in the changed oxidized upper portion of the vein it exists in quite visible particles, and sometimes, but rarely, in large nuggets. This shows that sulphate of iron is the natural solvent of gold. These larger grains and nuggets result in the running together or coalescing of all the minute particles contained in a mass of iron pyrites into a mass of gold. By water the sulphide or iron pyrites is oxidized into sulphate and the gold redissolved. From this solution it crystallizes into one mass as the solution concentrates. In the case of large nuggets the gold is probably in some way deposited

constantly in the same place from a similar solution bringing gold for a long time."

In conclusion, we may add that there appears to be a good deal to say in favor of both sides, and it seems probable that while a large amount of the gold, especially the grains and smaller nuggets may be in the placer according to the mechanical theory as water-worn, water-born pebbles, yet in the case of the larger nuggets, the size of them, and their remarkably pitted exterior, would suggest either some chemical action having taken place in the placer itself, or else in the pyrites and gold of the vein before the nugget was transported there. The matter is still an open question.

Origin of Gold Nuggets.

I notice an interesting article on the "Origin of Gold Nuggets," by Arthur Lakes, in the *Industry* of April 5th, 1894. In connection with the different theories advanced, it might interest some to know the results of my personal experience since January, 1850, in California, Idaho, Montana and other places.

In the first place I have come to the conclusion that by far the greatest portion of placer gold is derived from the disintegration of quartz veins, but by no means all of it. In support of the quartz theory and the formation of nuggets from quartz boulders, rich in gold, I will give you an example or two.

In 1858 to 1860 I worked in Myrtle creek, Del Norte county, California. By far the greatest portion of the gold was of the coarse order, and nearly free from quartz. On working up the creek the gold suddenly stopped. We continued on for some distance but found it worse. We then tried the sides and found the gold golog under a heavy slide, and no longer smooth. It was rough and scraggly, showing that it had not been subject to so much attrition as that in the creek bed. A large quartz vein carrying iron and copper would, if it continued, cross the creek at this point. Below this vein, during heavy rains, we would sluice off the surface and pick up the nuggets. One we found weighed \$28, at \$17 per ounce. I suspected that it was not all gold, though quite smooth on the outside. On laying it on the anvil and striking it lightly it broke into numerous pieces. The fracture faces were all black as ink, but on examination showed fine gold particles and iron about equally divided. On grinding a small piece, it showed no indications of coarse gold, the particles being as fine as flour.

A large nugget of apparently solid gold weighing over nine ounces, on being cut in two, revealed one ounce of black sand without a particle of fine gold, showing that it had all become welded together by some process. On Clear Water, in Idaho, a piece of gold was picked up in the tail race showing a little quartz on one side. I broke it in two, and it showed exactly the same fine gold as the Del Norte piece, only the gangue was quartz. So much for that theory.

Now as to the other, or one way that nuggets are formed, or rather placed in placers.

In 1851 a party of us went to Auburn, Placer county, Cal., camping on Spanish Flat. We sank a hole at the lower end of the flat to bedrock, obtaining about ten cents to the pan in fine gold in about a foot of fine gravel, under three or four feet of clay. This was not a good ravine, seeing there was very little water, so we went to another ravine close by where there was more water. In a few days after we left, gold was found in the grass roots in large pieces, some as high as \$3000, and the most of the ground paid \$1500 to the wagon load. No gold could be found more than a foot deep. The heaviest pieces were found about the center of the flat, growing less in number and size toward the edges and running diagonally across the flat. On investigation it was evident to me that that gold fell in a shower on that particular place. Also that the pieces had cooled sufficiently to solidify before they struck. All had about the same shape, concave on one side, convex on the other. When I advanced this theory I was laughed at a good deal, but not one of the merry ones could explain how that gold got there otherwise. I would here mention that no trace of quartz was ever seen in any piece to my knowledge. If gold can fall as a meteor in one place, why not smaller ones in other places? The same state of affairs took place at Ballarat, Australia, the largest pieces lying many feet above bedrock. A year or two ago I noticed in the *MINING AND SCIENTIFIC PRESS*, San Francisco, that a meteor was found in Shasta county, I believe, rich in gold. Now, why should people look for solution and precipitation theories, when investigation would soon give them evidence abundant to account for the presence of nuggets in a natural manner?—C. J. Barclay, in Mining Industry and Tradesman.

AMONG recent inventions is an opera-glass which can instantly be converted into a photographic camera.

The Burial of the Living.

From evidence that it seems difficult to dispute, it appears that, in the Celestial Empire, old, incurably diseased and hopelessly depraved persons are frequently burned alive in order to rid the community of the burden and responsibility of their care-taking. This arrangement is the result of a mutual understanding, the victims assenting to and sometimes assisting in the preliminary ceremonies. The usage seems to have been recognized by the highest authorities, and the burials have certainly been conducted with the sanction of the ruling powers. Great preparations are made and there is much ado, and sometimes a show of grief, but a great deal of the latter is evidently perfunctory, as there is an all-around feeling of satisfaction on the part of the spectators and more or less complacency on the mind of the victim, who is comforted by the assurance that he is fulfilling a tradition and will earn the respect of his ancestors and gone-befores. This custom is scarcely more strange and barbarous than the Japanese practice of compelling a man for certain crimes or calamities to commit suicide. It would, at least, have its compensations in that the criminal could be made to take himself off, and thus leave no unpleasant reflections upon the mind of hangman or executioner.

THE limestone monument bearing the title used as a headline is located in Decatur county, Ind. The center of the population in the United States, as located by the census of 1890, is in the above-named county, 20 miles east of Columbus, one of the cities of Hoosierdom. This is the second time in the history of our country that the center of population has been indicated by marking it with a monument. The first was the spot located by the census of 1810. The "monument," which may still be seen, is simply a flat stone embedded in the soil 40 miles northwest of Washington, bearing these three words, "Center of Population."—St. Louis Republican.

IT may interest those who have read pension speeches to know that there are about 4000 persons living in foreign countries who receive checks from Washington quarterly in payment of pensions. There are 2000 in Canada, who receive \$345,000 a year; 600 in Germany, receiving \$98,000 a year, and 750 in Great Britain whose checks aggregate \$126,990 a year. One man in the Fiji Islands draws \$24 every three months, and four times a year checks are sent to men who are living in Africa.

A RATHER STARTLING INDUSTRIAL DEVELOPMENT is reported from Victoria, Australia, where women have been substituted for men at no fewer than 200 railway stations. The result has been a saving of \$150,000 per year in salaries. The average wage paid to a station mistress is \$100 per year, whereas "the objectionable male" used to receive \$750. But, as the *Sydney Telegraph* asks: "How is the Victorian woman going to support a husband and family on \$100 a year?"

A GERMAN authority is responsible for the statement that worms eat wood only to get the starch. Hence he advises that trees for telegraphic poles be girdled in the spring. The tree in its growth will then consume the starch in leaf formation, and when it dies in the autumn the wood will be starch-free, and hence will offer no attraction to the worms.

THE largest aluminum manufactory in France, producing 200 kilograms a day, is located near Grenoble. The Société Electrometallurgique Française has in course of construction at La Praz, in the adjoining department of the Savoie, a factory which will produce 1000 kilograms a day, and it is believed that its capacity will be increased to 10,000 kilograms.

PAUL HUMY of Chicago is the inventor of a novel form of armor plate, which will soon be given a trial by the Government. Humy's plan is to put the edge of the plate instead of the surface to the projectile of the enemy. The plate is to be composed of two-inch steel plates set on edge and bolted together.

THERE are fifty-three cities in Brazil which have a population of 5000 and upward, thirty-one which have a population of over 10,000, fourteen of over 20,000, seven of over 40,000. Para has about 60,000, Sao Paulo 70,000, Pernambuco 150,000, Bahia 180,000 and Rio de Janeiro 407,000.

SCIENTIFIC MEN have demonstrated that a speed of 200 miles an hour can never be attained by anything that moves on wheels.

AN alloy that adhered so firmly to glass that it may be used to solder pieces together is made by a French chemist.

The Blue Lakes Canal.

So closely connected are water enterprises with mining operations that reference to storage and distributing reservoirs is always interesting. Herewith are presented illustrations of some of the works of the Blue Lakes Water Com-

pany, which furnishes Amador county with a water system both cheap and efficient. In the high Sierras are situated the storage reservoirs, some of them at an altitude of 9000 feet, filled by melting snow, and carried at a daily delivery of nearly 50,000,000 gallons by pipes and flumes 40 miles down to the head of the Amador canal, which is 42 miles long, terminating near Sutter Creek. The canal's capacity is 3000

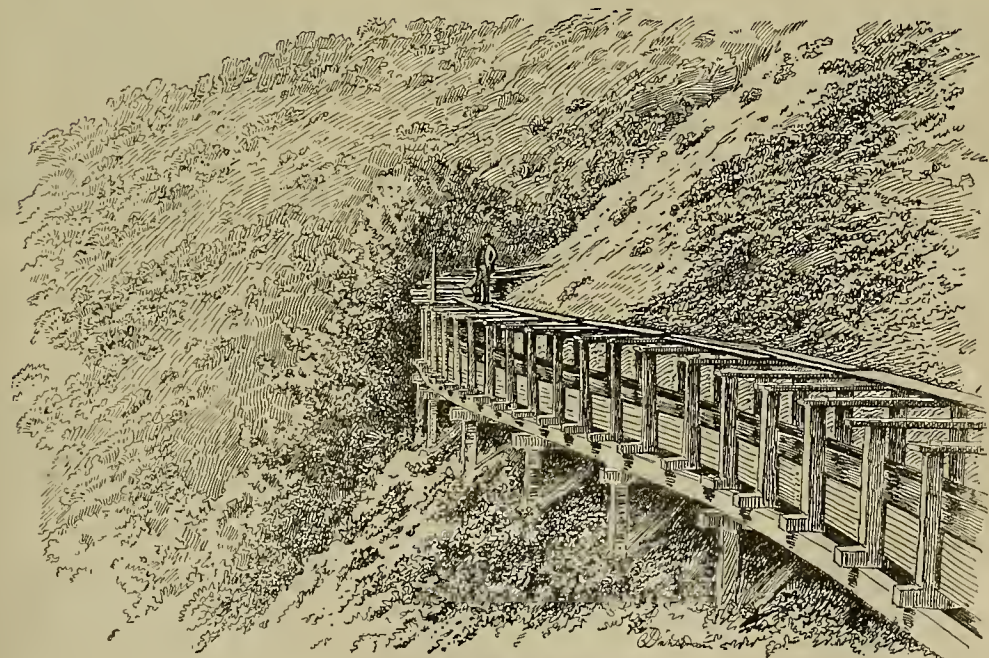
miners' inches a day, which, if required, could be greatly increased. The water is distributed to Jackson, Plymouth, Amador City, Ione, and to about 20 mines, there being an aggregate of 112 miles of canals and ditches. Power and light are supplied, and what the Blue Lakes Water Company has done and is doing furnishes an index of its possi-



HEAD WORKS OF THE AMADOR CANAL.



NEW YORK RESERVOIR.



THE BALD ROCK FLUME.

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The heat of the sun is supposed to be supplied by myriads of meteoric bodies in the vast regions of space.

The Southern Negro's "Jack."

One of the first questions asked by County Physician Wilder when the body of Dallas Stowe, the negro, was found hanging by a grapevine in the woods near town was: "Where's his 'jack?'" At this question the negro audience fell back as if getting away from a bomb that was about to explode. "What do you mean by his jack?" asked one of the white men present, "and why this commotion?" "Wait, and I will show you," said the doctor. He then felt in the pockets of the dead negro and brought out a tin box. He opened it, and it was found to contain a snake's head, a scorpion, a piece of iron, a rusty key, a bunch of "witch's yarn" and an ounce of salt. "This," said the doctor, "is the jack. Eight out of ten negroes carry them. With it they 'conjure' their enemies, throw a spell over them, and the average negro holds the jack in mortal dread. To show you their fear of it, just offer any negro here a dollar to put this box in his pocket." The offer was made, but no one would touch it. Dr. Wilder brought the box to the city and tried the darkies on it, but not one of them could be induced to touch it. The doctor hung this jack in his back yard, and says that his turkeys, chickens and woodpile are safe for this winter.—Charlotte (S. C.) News.

Be Wise and Richer.

Men are prone to make mistakes. This is notably true of many owners of mines who are unable to develop the same or to operate them on a profitable scale. Again and again have we observed poor men, wholly unable to operate their mines successfully, defeat themselves and the prosperity of the community by demanding an exorbitant price for a prospect. This should not be. We advise poor men to sell their properties at a moderate figure. It is wise to do so. It is far better than to demand two or three fortunes, and, by so doing, reap nothing but poverty. Capital can only develop and successfully operate big mining enterprises. It is willing to take chances. It can afford to do so, but the poor man cannot. To him the possession of a few thousand dollars is far better than the mere hope of securing many thousands. Therefore we repeat: Be wise and richer by selling your prospects at moderate prices. Push development work on them, stand by the progressive citizens who are trying to bring capital to the county, welcome the intending investor and be willing to share chances with him.—Pumas National Bulletin.

ONE of the most important questions of the day is, How far is it commercially possible to transmit water power electrically? Professors E. J. Houston and A. E. Kennelly have just made a compilation of facts and figures that serve to define very clearly the present status of this momentous issue, and estimate the distance to which Niagara water power can be economically transmitted by electricity. Although water power has not yet been made available at a greater distance than 25 miles, it has been generally considered that it could be distributed commercially at a radius of 50 miles. Messrs. Houston and Kennelly show that if reliable machinery can be bought cheaply enough, and the conductors can be safely operated at sufficiently high pressure, there is nothing to hinder the Falls of Niagara from stopping steam engines in New Orleans, La., by underselling their power.

THERE are now more than 8000 steam engines used for transportation service on highways in Great Britain. The fact was stated by Lieutenant Colonel Templer at the Royal United Service Institution some days ago, in a lecture advocating the use of steam transport for army purposes. He said that extensive experiments had shown that a train of wagons can, on the best roads make but 15 to 20 miles a day, while a traction engine can transport the same train 60 to 70 miles a day, and at less cost. Horses sooner or later give out, but the engine can keep right on, day after day, under all circumstances. The 8000 engines mentioned are, of course, used for a great variety of work, mainly about farms, beside simple transport.

A FRENCH ELECTRICIAN, M. Trouve, catches fish by sinking in the water a net with an incandescent lamp attached. The curious fish collect around the light, when a pneumatic tire around the edge of the net is silently inflated and rises to the surface, entrapping them without frightening them, and hence without destroying the spawn—a great drawback to ordinary net fishing.

THE cable informs us that Dr. Pean has presented to the Academy of Medicine at Paris a man 41 years old, whose voice, destroyed by a surgical operation, had been restored by Dr. Kraus, who made an artificial larynx for him. Insertion of the instrument is painless and easy. The larynx consists of a spinal silver tube covered with rubber.

Scientific Progress.

The Roar of Sun Spots.

Nothing has been heard lately of Mr. Edison's attempt to make the roar of sun spots audible by means of an electro-magnetic device connecting the earth currents with a telephone, says the New York Sun. The idea was that the impulses believed to be transmitted from the sun to the earth when great spots are forming on the solar surface might be translated into sound waves, thus, in a sense, enabling us to listen to the voice of the god of day when his temper is disturbed.

Recently an experiment of similar nature has been tried in England by W. H. Preece, and apparently with success. During the magnetic storm of March, which seemed to be connected with disturbances in the sun, telephones were inserted in some of the principal telegraph circuits, and they gave out various sounds. Sometimes the noise was like the twanging of musical strings or wires; then again it resembled whistling. Some observers hear reverberations in the telephone like the rumbling of heavy carts. Occasionally high-pitched notes and screeches were emitted, followed by low musical sounds like the laps of waves upon a beach.

While these strange noises were given forth from telephones attached to telegraph lines—one was the Liverpool-Hamburg wire—auroral lights, white, green and rose-colored, were seen in various places playing up and down the sky, and the earth appeared to be tingling with electric currents.

Evidently there is still a great opportunity for discovery concerning the origin and nature of such magnetic storms and their relation, if any, to the sun. So far, speculation has held the field in this direction, but a few facts are beginning to emerge, and any day a brilliant discovery may illuminate the whole mystery with a flood of light. Then, perhaps, we shall know whether it was the earth or the sun that made Mr. Preece's telephones sing and whistle and shriek, while the heavens shimmered with light that was not of the stars.

The Breathing-like Movements of the Earth's Surface.

Prof. John Milne makes it clear that the earth is breathing, and that the tall buildings upon its surface are being continually moved to and fro, like the masts of a ship upon the ocean. Although few countries are seriously troubled by earthquakes, important earth movements are occurring at all times and in all lands that have an appreciable effect on the surface configuration. These movements are now being studied by physicists. It is stated that in both Germany and Japan a tide-like movement of the earth is often distinctly apparent, the ground being gently tilted every 24 hours (more at night than by day), and hullings and chimneys are slightly inclined like stalks of corn in a steady breeze. So far as Japan is concerned, this phenomenon is attributed to the opening and shutting of the crumpled strata forming a range of mountains. The various movements of the panting earth have been classified, and among them are the microseismic or tremor storms, which are defined as long, flat waves like those of an ocean swell, and the heaving effect produced in certain districts by changes of atmospheric pressure. It is now found, too, that while the waves from distant earthquakes may be appreciable to the senses for only a few hundred miles, their vibrations may extend around the world.

The New Metal.

The newcomer, "silvinit," is an alloy composed chiefly of aluminum, and although it has been introduced with a flourish of trumpets, its practical status has not yet been determined. It has great lightness,

silvery luster, malleability and ductility, and, although comparatively soft, is tough and strong. In decorative work it may be used either in its natural color, which is not easily tarnished, or painted with oil colors, which it "takes" well. The manufacturers also claim that it enamels well, but if so, the enamel material applied must be fusible at an exceptionally low temperature, as the metal itself softens and fuses very readily. The suggestion that it would be a good substitute for corrugated iron for roofing is ill-advised. In the event of a fire, a silvinit roof would collapse very quickly, and thus cause a more complete wreck than would result if iron were in use. Sulphuretted hydrogen does not tarnish the metal, even after prolonged exposure; ammonia, on the other hand, distinctly affects its surface, while caustic alkalis and dilute mineral acids rapidly dissolve it. Vegetable acids, such as acetic, do not seem to produce any impression on the metal, but whether prolonged action, aided by alternate wetting and drying by exposure to air, will cause erosion, time alone can prove. There is undoubtedly a large field open for this valuable metal, but that it will really supersede any of the other metals in common use is not likely.

The Highest Windmill Tower in the World.

The town of St. James, L. I., can boast of having the highest and strongest windmill in the world. The proprietor of the land on which it has been erected tried for years to construct a well on the elevated land near his house, but without success. The spring from which the windmill pumps is on the beach at the head of a distant bay. The contiguous land rises so rapidly, and the trees are so high, that it was necessary to raise the windmill 150 feet, so that the bottom of the windwheel would be above all obstructions within 1000 feet of it. The scale on which the mill is erected can be seen from the fact that there are 20 barrels of concrete in the foundation piers, besides 40 barrels of cement, 20,000 bricks, 42,000 feet Georgia pine, and more than six tons of bolts and washers and iron plates. It is 22½ feet in diameter and 190 feet above high water. There are 6000 feet of pipe between the windmill pump and the reservoir, which contains about 65,000 gallons. The windwheel has frequently filled it in two days. The maximum height to which the water is forced by this mill is 223 feet, before reaching which it has to pass a long line of pipe. There is no difficulty, however, in making a plant to throw the water much higher than this. It is merely a question of the pump, pipe and fittings being able to withstand the pressure and the windmill being large enough to give power sufficient to do the work. Pumps are made strong enough to raise water 2000 feet, if necessary. The only question to be carefully considered is that of the tower, for it must be made to withstand the roughest weather likely to be met with in those latitudes.

Science and Americans.

Science is supreme in American production, and the Americans have outrun us all in its application. They were the first to utilize electricity, not merely in the development of telegraphy and the kindred arts, but as a powerful ally in manufacture. In the welding of metals, for instance, it now plays an important part. It has reduced the price of aluminum from £2 to 2s. a pound, and the metal has now in consequence passed into common use; it enters into the fabric of the bicycle; it is made into shoes for the horses of Russian cavalry; it is embodied in the ignifugal figure which crowns the Shaftesbury Memorial.

In iron and steel, the use of highly developed machinery, which is no more than the application of science, has revolutionized

production. The new drop-hammer has brought down the price of American plows to less than £1, and in the making of all sorts of agricultural implements it is calculated that 600 men can now produce as much as 2145 men could a few years ago. Where a single workman could make three dozen pairs of sleeve links in a day, a boy can now make nine thousand.

The manufacture of pins still holds its own as an "object lesson;" but whereas Adam Smith notes with astonishment and admiration ten men turning out 48,000 pins a day, the modern American manufacturer finds no difficulty in supplying 7,500,000 in the same time, as the result of the labor of five pairs of hands. Compare this with the state of things at the time of the War of Independence, when imported pins sold for 7s. 6d. a dozen, and when, to encourage home industry, the Government offered £50 for the best 25 dozen of pins made in America equal to those imported from England.—The Edinburgh Review.

PROF. LAWSON TAIT says there are certain orchids that secure the fertilization of their stigmas by making bees drunk. In no other way could they get these insects to cut up the necessary antics to carry the pollen to the proper place. Every such flower is a veritable liquor saloon, licensed by nature. The beverage supplied is distinctly alcoholic.

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Mechanical Progress.

How Matches Are Made.

There are many persons now living who can remember when the common method of obtaining fire for domestic and other purposes was by means of flint and steel; the sparks which fell from striking the two together, falling upon a piece of punk, or dried, decayed wood, or carbonized linen or cotton goods, when fanned into a flame, producing the necessary heat with which to start a fire. This primitive method was in general use until the early part of the present century, when the first successful attempt was made to produce fire for ordinary purposes by means of chemical agency, but it was not until about 1827 that the first friction matches were considered of practical use. In 1833 they became an item of commercial importance throughout Europe, and were soon after introduced extensively into this country.

The expansion of the business since that time is shown by the annual statement of the Diamond Match Company at its meeting in Chicago not long since. President Barber's annual statement showed that the business for the year 1893 had made a net profit of \$1,359,577.15, as against \$1,050,000 in 1892—a remarkable showing for a year of such great business depression. This enormous sum represented 15 per cent on the invested capital.

When the internal revenue law was in force in the United States, the tax at one cent a box, in 1881, amounted to \$3,172,258. Since then the business has steadily increased. In Great Britain the yearly output is valued at about \$8,000,000, or upward of 300,000,000 matches daily. In France the Government has exclusive right to manufacture matches, for which privilege it pays annually 16,000,000 francs, or \$3,200,000, and has the business concentrated in about a dozen large establishments. Norway and Sweden have been among the largest match-producing countries of the world, their exports amounting to about 20,000,000 pounds of matches per annum. In Germany there are now upward of 200 factories, producing about 70,000,000,000 matches yearly. In Austria there are more than 150 factories, the output of which does not fall much below each of the other countries named.

It is difficult to ascertain the average number of matches daily used by each person, but in Europe the highest authorities place it from six to ten. It is probable that the proportion is still greater in the United States.

The wood used in the manufacture of matches is principally white pine, poplar, aspen and yellow pine. In the United States white pine is used almost exclusively. It burns freely, steadily, slowly, constantly and with a good volume of flame. The wood is soft, straight grained, easily worked, and its light weight is of no small consequence in the matter of transportation charges, which are usually high on combustible articles.

For the best grade of matches the choicest quality of cork pine is used, a variety of white pine, the trees being large and well matured. The Diamond Match Company about 12 years ago secured hundreds of millions of feet of choice standing cork pine timber on the waters of the Ontonagon river in the upper peninsula of Michigan. This company now cuts annually upward of 30,000,000 feet of this timber, but this is by no means all that is used in the manufacture of matches in this country. Millions of feet more of choice white pine timber are bought every year and made into matches by a number of factories under control of this corporation.

In Sweden the method of manufacture is as follows: The timber is cut into blocks about 15 inches long and placed in a turning lathe. With each revolution a slice or veneer

is peeled off the thickness required for the match sticks, while at the same time eight small knives cut the slice into seven pieces, like ribbons, and of the length required for the sticks. These ribbons are then broken into lengths of six to seven feet, knotty and defective pieces are removed, and the ribbons are then fed through a machine which cuts them into pieces like a straw-cutter, these then passing through an automatically arranged machine with cutters, which slices off as many pieces, the thickness required for a match, as there are cutters. One machine will turn out from 5,000,000 to 10,000,000 match splints in a day.

In this country choice, clear two, three and four-inch planks are used, also pieces from the ends of planks and timbers, edgings and other suitable parts of the log not utilized. These are cut the required length and sliced or split by machinery adapted for the purpose. After passing through these machines, the match splints are dried in heated revolving drums, during which process the loose splinters clinging to the splints are separated. They are then placed in a sieve and sifted, an operation which finally places the sticks in parallel order so that they can be conveniently banded, after which they are ready for the dipping operation.

The head of each stick, to be thoroughly dipped or covered, must be separated from the others, that no danger shall ensue from ignition, as would be done if they came in contact with the inflammable material used in the coating. The sticks are separated by machinery and placed each by itself in a dipping frame which is fitted in a movable lathe, and a number of these lathes are placed in a machine. One person can arrange with one of the machines nearly 1,500,000 splints in a day. The splints are then heated so as to more readily absorb paraffine, which is confined in its molten state in shallow pans.

The first dipping covers the head of the match sticks with the paraffine preparation; by the second operation it is covered with the igniting composition, different devices being used for this purpose. A competent person will dip about 8,000,000 matches a day. After the last dipping the frames containing the matches are placed in a heated room, that the igniting composition may be dried. They are then removed from this room and packed in boxes ready for shipment.—Chicago Journal of Commerce.

Glass Impervious to Heat.

Glass that resists so high a temperature as to be practically fireproof was reported from Germany a few months ago; and now, in the same country, it is said, glass is made which will transmit light freely, but not heat. For example, a plate of this material, four-tenths of an inch thick, containing 2.8 per cent of iron in the form described as "ferrous chloride," allowed only 4.06 per cent of radiant heat to pass through it, while another plate of equal thickness, and containing quite as much iron as "ferric chloride," permitted 11.2 per cent to pass. The chemical distinction is exceedingly small, but the effect is very marked. Uslog oxide instead of chloride, and again having it in a ferrous condition, one per cent produced a glass having a very faint blue tinge, but even more impervious to heat than the other sample. A layer .332 inch in thickness allowed only 0.4 per cent of the heat from a bat's-wing gas flame to pass through, 0.72 of that from an argand burner and 0.73 of the heat from a lime light; but it would transmit 12 per cent of heat from sunlight. Ordinary window glass, though, lets 86 per cent through. The chief use to which the discovery will be devoted at first probably will be the manufacture of lamp and gas shades, and possibly decorative work in connection with electric lighting.

PROF. JAMES MCLEAN of Chicago is trying to revolutionize traction by using com-

pressed air on engines in the place of steam. This would greatly change the shape of locomotives. He would put his air-tank where the cab now is, do away with the boiler and tender, and employ a rotary device instead of a reciprocating piston, in order to apply his power to the driving wheels. He doesn't say where he would put his engineer.

New Metal Cutting Saw.

A new metal-cutting saw has been devised by W. Hartman of Fulda, Germany. The cutting edges of this saw are inclined alternately in opposite directions, all the leading points and all the succeeding points of the cutting edges being at an equal height, and the sides of the blade may be ground behind the cutting points to the surface of a hollow cylinder. The leading cutting points may be deeper than the succeeding points of the same cutting edge, so that each single tooth is set, with regard to its cutting edge, after the manner of a turning or planing tool.

To make edge tools that are brittle and hard hold an edge, put them in boiling fat for two hours; then take them out. Treated in this way they will retain their hardness without being brittle. Another simple remedy for tools that are too hard is to light a piece of paper and run it across the edge after grinding. This will draw the temper just right.—The Industrial American.

THE statement is made that the band re-saw is fast displacing the circular re-saw for re-sawing lumber, on account of the thinner kerfs made by the band re-saw and the simplicity of the machine itself.

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Electric Progress.

"Unknown" Causes of Fires.

H. C. Cushing, Jr., says: Any fire which takes place in any city of considerable size is recorded as to location, loss, amount of insurance carried, and the cause, or supposed cause of the fire. In the city of Boston there were, during the year 1893, 1233 fires, with a loss of \$5,024,765.04. Twenty per cent of all these fires are from unknown causes. When these unknown causes cost property owners more than \$1,004,955, it is about time that some investigations were made beyond attributing these causes to spontaneous combustion, incandescent or arc light wires, or to any other wires which enter a building. When an inspector cannot satisfy himself that it was from stoves, careless use of kerosene or matches, it is a very easy thing to lay it to spontaneous combustion or the unfortunate electric light wires.

The person attributing fires to the electric light wires being crossed with some trolley or other high potential wire outside is probably not aware that every wire entering a building is thoroughly protected at its entrance by a fusible metal which will blow out at any overcharge, thus deadening every wire in the building; and, moreover, there would have to be a decided ground within the building, which is nowadays a very rare occurrence, as the writer's investigations have proved that out of 25 prominent buildings in the city of Boston the insulation resistance to ground proved to average over 2,000,000 ohms. But when I say that the electric light and power wiring should not receive the blame as often as it does, I do not mean to take the responsibility off of electricity, for it is through this agent that I have reason to suspect the origin of many of the "unknown" causes, so-called, in fire reports.

When electricity is allowed to roam at large and in vast quantities all along our water and gas pipes and through the ground upon which the city is built, in order to get back to the sources from which it was generated, which are the street railway power stations, it is this state of affairs which is creating a trouble, the extent and seriousness of which is only known to those few who have made it a study. These street railway power stations, operating the overhead trolley system, are constantly generating thousands of horse power of electricity, sending it out by overhead trolley and feed wires to the cars which it operates, and returns it to the station by means of the water and gas pipes which lie in its course. For this reason there is a tremendous electrolytic action going on all the time. When I speak of this trouble from electrolysis I do not mean that Boston and Cambridge are the only cities affected, but every city in the United States operating a trolley system with ground returns. The writer has samples of gas and water pipe completely eaten through by electrolytic action in three months after having been placed in the ground near street railway returns. This effect has been going on and will continue to go on as long as there is a grounded wire in electric street railway construction.

Wherever this returning current flows in any quantity along a pipe there is bound to be a large fall of potential, varying in different pipes as their carrying capacity increases or diminishes.

In the cellars and basements of many houses I have found quite a large difference of electrical pressure between two pipes entering within one foot of each other, and in one instance it was a very easy matter to take a piece of hoop iron and draw an electric arc sufficient to ignite a piece of waste held near it, and by connecting these pipes together with a piece of No. 18 copper wire, the current flowing through it was sufficient to heat it so that it was impossible to lay

one's hand upon it. In the basement of another building, not 200 yards from where the writer sits, I find a man using 25 amperes at 8 volts pressure, or electricity enough to run small motors and incandescent lamps, as well as the electric bells in the entire building, by simply twisting his wires around two different water pipes which enter the building.

Some time ago my attention was called to two pipes which were so close together that the vibration of an elevator engine caused them to knock together just sufficient to create an arc every time a contact was made and broken. This had been going on so long that it had almost completely eaten through the gas pipe, and it is perfectly evident what would have taken place had this been allowed to go on unobserved. The gas would have been ignited, as soon as the first small hole appeared, by the electric spark, and disastrous results would have undoubtedly followed.

The difference of electrical pressure upon water and gas pipes is now so well known that in a number of cases in the cities of Boston and Cambridge the ordinary electric bell battery is entirely discarded, and the wires from the bells connected directly to the water pipes, the latter furnishing an inexhaustible supply of electricity at the proper pressure to run any number of bells or gas-lighting apparatus, and also to do any quantity of mischief. I can see no reason why fires should not be attributed to this cause, when it can be proved that such a difference of electrical pressure really does exist between any two pipes entering a building in the vicinity of the trolley system of street railways.

There is only one way of eliminating this rapidly increasing danger, and that is by compelling the electric street railway companies to insulate, from the ground, their entire electrical circuit, and just as soon as a suit for damages is brought by the water and gas companies for a complete system of pipes destroyed by electrolysis, the railway companies will begin to remedy the evil, which they are more fully aware of than any one else.

Electricity in Plants and Fruits.

There is no doubt, says *Le Genie Civil*, that nature makes use of an as yet little known but important property of electricity in its different forms for making plants grow, flowers bloom and fruits ripen. It is a secret that it will disclose to us one of these days. Some quite curious experiments in electric culture have already been made in different places, and results have been obtained that appear to be satisfactory, but they have not yet the definiteness and permanence that would permit of profitably converting our fields and kitchen gardens into electric batteries.

It has been ascertained, however, that fruits are in a continual electric state. Upon puncturing them at the top and bottom and closing the circuit, it has been possible, by means of a multiplier, to study the variations of such electric state. The ascending sap of trees and the cortical sap, which have not, as well known, the same chemical composition, react upon each other and afford marked electric phenomena. From the pith to the cambium the layers are less and less positive, and from the cambium to the epidermis they are more and more so.

What will be the result of future studies upon this subject undertaken with commendable patience? We can only make a surmise. In the intensive hothouses called forcing houses fruits are already obtained at all seasons, and the electric light is used for giving the forced plants the impression of the dawn and of the high and setting sun. They are very sensitive thereto.

Perhaps upon combining this external action with the passage of an appropriate current into a soil charged with chemical products that it would decompose, we might

succeed in producing astonishing fruits and flowers in hothouses, and, with the wand, make forests grow in bare gardens. There is nothing improbable in such magic, seeing that electricity, according to experiments already made, plays a role as mysterious as preponderant in vegetation.

A NEW application of electricity to manufacturing purposes is reported from Germany in connection with the use of metal plates for pressing and finishing woollen goods. Such plates, which require to be heated, have hitherto usually been warmed either in an oven or by means of steam, but both of these processes are troublesome, and involve loss of time, besides leading to uncertainty as to the temperature obtained. It is now proposed to heat the plates by electricity.

AN electrical experiment of great interest was recently conducted by Prof. Julius Friedenwald at the Baltimore College of Physicians and Surgeons. By means of a flexible rubber tube a diminutive electric light was introduced into the stomach of a patient and, the lights in the room being lowered, over 200 persons viewed the workings of the patient's organs through the transparency which the light created in the abdominal wall.

A COMPANY has been formed to utilize the water power in Big Cottonwood canyon, fourteen miles from Salt Lake City, and convey the energy to the latter point as electricity. For two-thirds of the year, it is said, 3000-horse power will be available, and for the rest only 2500.

Practical Information.

To Prevent Iron from Rusting.

Following is the substance of an essay recently read before the Paris Societe d'Encouragement by Octave de Rochefort-Lucay, on the Bertrand process for coating with magnetic oxide and enameling iron and iron carburets, and on a new process of tinning for cast iron. Barff and Bower were the first, practically, to coat iron, steel and cast iron with magnetic oxide so as to form, at the cost of the metal itself, the protective layer that is obtained usually from paint or enameling, with a thin coating of the metal that is not oxidizable. The Bertrand processes are more simple than those of Bower and Barff and are based on a new discovery in chemistry, which may be stated thus: If a thin adherent film of another metal is formed on the wrought iron or on the cast iron, and this iron or cast iron, heated to 1000 degrees, is exposed to a current of oxidizing gas, the oxygen penetrates through the film and oxidizes the iron or the cast iron, and magnetic oxide is the result. The formation of magnetic oxide thus obtained continues indefinitely, and the thickness of the coating of oxide increases according to the period of exposure to the oxidizing current, providing the temperature remains at about 1000 degrees. The film of metal deposited in the first instance disappears in some obscure way, forming oxides which mingle with the magnetic oxide or volatilize, according to the nature of the metal of which they are composed. M. Bertrand had to find the best method for depositing it on the article to be coated, and he has found that bronze—a mixture of copper and tin—gives every satisfaction. For depositing this bronze on the wrought iron and cast iron, M. Bertrand uses electricity or wet baths and sulphophenolic acid. The following is the method adopted in the Bertrand manufactory for an oxidation: The article is cleansed (the cleansing is not indispensable) and then dipped a few moments in a bath containing a solution of sulphophenate of copper and tin. The coating of bronze being formed, the article is immediately washed with cold water and dried with saw-

dust. The article dried is put into a furnace. Oxide forms, and at the end of 15 to 30 minutes, according to the articles, the article is taken out, sufficiently oxidized. The coating produced varies from 1 to 10 mm. to 1-5 mm. M. Bertrand uses electricity to ascertain if the coating is of sufficient and uniform thickness, and in so doing he makes use of bells. If, in putting the two wires in contact with the oxidized articles, the bells ring, the current passes, the oxidation is insufficient; if it remains silent, the oxide formed is of sufficient practical thickness, because it prevents the electric current from passing.

Process of tinning cast iron: M. Bertrand has used sulphophenolic acid to obtain tinning on iron. He dissolves salts of theine in a mixture of water and sulphophenolic acid at the rate of one per cent of theine salt and five per cent of sulphophenolic acid. In this mixture the article, which is previously cleaned, is dipped, and it is at once covered with an adherent coating of tin, and afterward, by means of rotating brushes in wire and cloth, the coating of tin is polished and a result is obtained that is both effective and cheap.

Process for enameling: There are not more than two processes for enameling cast iron. In the first, called hot, the iron, heated to a vivid red, is powdered with a flux powder, boro-silicate of lead, distributed with a sieve, then it is heated, and when the flux fuses, it is powdered afresh with glass, more soluble, forming the glaze of the enamel. This process is dangerous to the operator and even impossible for large articles, nor does it allow decorations. The second process consists of dressing the cast iron by three distinct and successive operations in the furnaces with a kind of pottery. In the Bertrand enameling the article is first coated with magnetic oxide, then dipped in boro-silicates of lead colored by metallic oxides, to which is added a pipe clay in order to give more body. The article thus covered cold, by dipping or with brushes, is put into the furnace; the enamel adheres and vitrifies at the usual furnace temperature used by enamellers. By putting a coating of colored enamel with a brush on a first coat simply plain, it is possible to make any decorations desired, which may be burnt in at one operation for outdoor vases. These results, due to the first oxidation with magnetic oxide, are remarkable as much for the color as for the tenacity of the enamel and its resistance to rough usage.—Iron Industry Gazette.

Where Scrap Iron Goes.

Nothing goes to waste on a big railroad, and every scrap of iron and much second-hand material is valued at a fixed price and carried on the books as so much stock on hand. The system followed by the storekeeper's department of one railroad is a sample of many. The second-hand metals are gathered and placed in piles, regularly assorted. Then they are classified by the foreman and taken into stock by the storekeeper or assistant. There are regular schedules—one of material which can be used again, which is denominated "second-hand," and another of material which has to be melted before it can be used, which is known as "scrap." The classes are arranged something after the following order: Steel scrap, Nos. 1, 2, 3, 4, 5 and 6, at prices ranging from \$28 a ton down; wrought iron, Nos. 1, 2, 3 and 4; cast iron, Nos. 1, 2, 3 and 4. Even borings are taken into account, brass borings being credited at eight cents per pound, and brass scrap and copper at twelve. This material is shipped to division headquarters when a carload has accumulated. Here it is disposed of by the storekeeper on order of his chief, being shipped in carloads to big dealers in old metals in large cities. Much of it goes to Pittsburg, Cincinnati and such points. Orders for as high as 500,000 pounds of one kind of material are occasionally received from single firms. Most

of the second-hand material is used over again in the shops, but it is previously taken on the hooks at a fixed price by the store-keeper and is charged up to the account of the articles for which it is used. All usable No. 1 wrought iron is received and charged up at one and one-fourth cents a pound, and cast iron at one cent.

Warmth from Paper Clothing.

The successful inventor is not always the man whose ideas are new. He is often the one who puts an old idea to a new and important use, incidentally improving it in detail. It is proverbial that a single newspaper spread over a bed on a winter night will give warmth to persons sleeping therein; and it is common for guards on elevated railway trains, for teamsters and for other people much exposed to cold to stuff the same material inside their coats for the same purpose; and they secure the same result. J. C. McLaughlin therefore said to himself one day, "Why not have a special paper for such uses?" And his answer to himself is a patent, taken out two or three months ago, for what he calls "fibre chamolins." This is made from the best quality of chemical wood pulp, preferably spruce, treated by the Mitscherlich process. His product is paler than unbleached muslin, as thick as the kid from which shoes are made, almost or quite as pliable, tough enough to hold stitching, light in weight and very warm. This material is specially adapted for interlining of waistcoats, overcoats, jackets and skirts; although with a detachable chintz cover it may be used for bedcoverings and can also be worked up into garments not intended to go into the washtub. It is better not to have it exposed directly to wear, weather or water; but suitably covered, it promises to become serviceable as a substitute for more costly goods. Mr. McLaughlin claims that it is sufficiently porous to allow exhalations from the body to escape, yet close enough in texture to exclude dust. Warmth with lightness will be its strong point.

Insurance and Gambling.

Certain forms of wagers are approved at the present day universally by statute law. The most familiar forms are fire and life insurance. It is perhaps of interest to note here that those forms of wager, now so common and so universally approved, came into popular use slowly, against a strong current of disapproval, upon the ground that they were immoral. As late as 1803, in the State of Pennsylvania, life insurance policies in which the assured had no interest were held to be void.

There is no form of contract which comes nearer to the essential features of a wager than fire insurance. What does a person buy for the premium which he pays? No certain return, only this: That in the remotely possible event that the building insured shall be burned, then the insurer agrees to make good the loss up to the amount of the policy. The amount of premium bears the same ratio to the sum guaranteed as the chance of burning does to the chance of not burning.

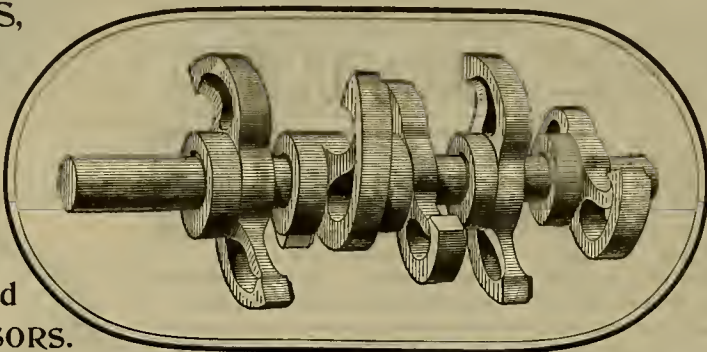
AN EFFICACIOUS REMEDY for obstinate cases of insomnia is to lie flat upon the back and inhale and exhale deep, long breaths; take 30 or 40 of them, then turn on one side—preferably the right—and sleep will come before you know it, unless you have the pernicious habit of taking your work to bed with you. The facility with which we can rest and recuperate from great fatigue, either mental or physical, depends largely upon our power of dismissing thought and encouraging a state of vacuity. It is a question of habit, but one which is in every one's power to acquire; and of so great value that it is worth more than a slight effort to win. — From "Sanitarian," in Demorest's Magazine for May.

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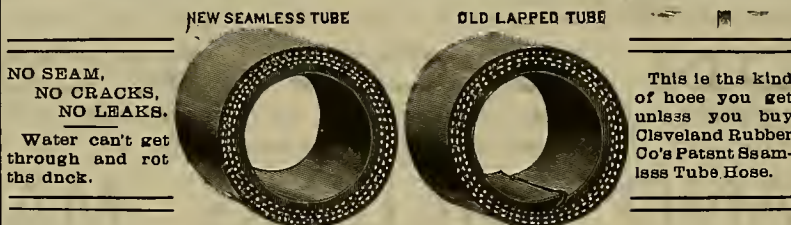
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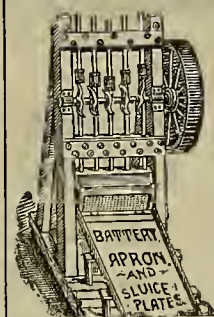
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At Great Falls, Mont., the volume of water passing in the upper Missouri is about 4800 cubic feet a second, and at Fort Benton (twenty-five miles farther down stream) United States engineers report it at 4331; and now the question arises, what becomes of the rest? A helief is entertained that the water drains off through the sand and supplies the great artesian well basin of South Dakota.

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Mining Summary.

The following is mostly condensed from journals published in the interior. In proximity to the mines mentioned.

CALIFORNIA.

Amador.

Dispatch: A company of experienced and wealthy mining men have taken hold of the Clinton Bar mining claim, on the Mokelumne river, a few miles from Aqueduct City, in which F. M. Cook of the Oneida is interested, and will commence work at once on an extensive scale. Mr. Chase will have the management.

The Kennedy mine is to be pushed down to a depth of 2000 feet, and arrangements are now being made for the work. The sinking will be done by contract, the contract to be given to some of the regular workmen at the mine.

THE MAYFLOWER.—*Record:* The Mayflower gold mine at Amador City extends from Ranceria creek to the north line of the Keystone mine, and includes the Bunker Hill, Mayflower and South Mayflower, the Little Amador and King mines, covering an area of nearly 5000 feet in length, with a width varying from 300 to 600 feet. Near the north end of the property is located the 40-stamp mill and hoisting works of the old Bunker Hill mine, in which region and on the adjoining Mayflower ground the most of the present development work is being done. Some 80 men are now employed, and 20 stamps are at work. It is expected that the additional 20 stamps of the mill will soon be at work crushing the output of this part of the property. The company is preparing to reopen the Johns shaft on the south side of the ridge near Amador City, on the Little Amador property. This shaft was originally sunk to the depth of 700 feet. When cleaned out and repaired, development work and further sinking will begin from that point. As soon as developments will warrant, a new 40-stamp mill with all modern improvements will also be erected.

Calaveras.

Echo: Angel's Camp has more idle men looking for work than any other town in the State, and a public mass meeting was held by the citizens of that burg last Sunday night to take steps to drive bad characters out of the town. The Viertong mine, composed of five claims, has been sold to a Montreal syndicate for \$150,000, and will be opened within 60 days. It will give employment to 500 men. A 100-stamp mill is to be erected and 40 concentrators will be used. The Excelsior mine on Albany Flat has also been sold, and negotiations are being made for the purchase of the Birney mine and an abandoned one on Carson creek.

TAKING PRECAUTIONS.—*Prospect:* The Utica Company evidently does not intend to be caught napping, and the rich treasure which is weekly turned out of the mills, and which is a tempting bait for desperadoes, is well guarded. Ten special deputy sheriffs have been sworn in to guard the property, and at night they patrol the grounds and buildings armed with ugly looking Winchester. Street lamps have also been placed at intervals over the grounds belonging to the company, so that at night every part of the premises is lighted, and it would be hard work for any underlenders to escape the detection of the watchful guards.

QUICK WORK AND GOOD RESULTS.—*Angels Echo:* Six weeks ago a little man, dressed in corduroy pants and working clothes, registered at Dolling's Hotel, as J. V. Brooks, of Louisville, Kentucky. Nobody in the town knew him, except Charley Tyrone, who received through him a letter of recommendation from E. K. Stevenot. The morning after Mr. Brooks' arrival he engaged a team and started for Chaparral Hill, near Albany Flat, to look at some mines, and some person in town spread the report that the little man was here in the interest of Angels. In fact it leaked out that he had among us the great little Prof. Brooks, the man who is known in the West as the identical individual who makes or kills the sale of mines.

The professor has banded his work with wonderful dexterity, made recent and hurried trips to San Francisco and Angels and with the following results: He has sold to a Montreal syndicate, with a large capital to back him, the Viertong mine, composed of five claims, for the sum of \$150,000. He has contracted with a Holland syndicate for the purchase of the Birney mine. He has sold for Fred Brunner the Excelsior mine on Albany Flat, and Carson creek will have an old abandoned mine opened and sold by the little man from Kentucky. Such a man as Prof. Brooks is the kind of an expert that Angels will always welcome with open arms.

We are informed that the Viertong mines will be opened within 60 days and will give employment to over 500 men.

Mono.

A STRIKE IN BONNE.—*Miner:* For the past month or so Bodie stock has been going up, and rumors have been heard to the effect that a strike had been made. Superintendent Kelly this week reports that he has five feet of high-grade ore in the north drift from west crosscut No. 1, 300-foot level.

Nevada.

THE MT. GEORGE.—*Herald:* The owners of the Mt. George mine, located out on Rush creek, are about to remodel the hoisting works and put in Pelton water wheels, so that the mine can be developed faster. Wm. May will do the work. The Mt. George has paid its owners about \$40,000, and the present owners confidently expect to make more than that out of it very soon. It is a mine which has paid from the grass roots down, and has never been prospected to any depth. Its late owner made

a living out of it for years by just scratching off the top, and the new company, comprising Frederick Zeitler, Dr. C. W. Jones, John F. Kidder and others, ought, with improved machinery and skilled miners, to make a lot of money out of it.

WILL RESUME.—Edwin Tilley is about to resume operations on the Midnight, located on Deer creek, just below Suspension bridge. The mine has lain idle for a couple of years.

A NEW MILL.—The Osborne Hill mine, below Grass Valley, is to have a new 20-stamp mill. Work has already begun on it.

STAUKE RICH OAR.—*Union:* Last week an unexpected strike of importance was made in the incline shaft being sunk on the Sunrise mine (Sebastopol) on Osborn Hill. The ledge is of good size, abounding mineral and gold in nearly every piece of ore examined, and is estimated by those who are good judges to be worth \$100 to \$150 a ton. A strike in the above locality means much, as failures there are few and far between. Machinery will soon be placed on the mine and a contract let to sink the shaft 100 feet.

Placer.

Colfax Sentinel: Mr. Roderick, of San Francisco, is about to erect a ten-stamp mill on the Zipp & Sleszenop mine, at Blue Canyon. This is not a new mine, as it has been worked for the past seven years, has a five-stamp mill already, and has paid. This will make three ten-stamp mills for eastern Placer within six months.

Plumas.

GOPHER HILL.—*National-Bulletin:* The company owning this mine has two large streams playing upon the gravel deposits—one 54-inch monitor and one 6-inch, under a pressure of 350 feet. The smaller one will throw a stream about 320 feet. The restraining works and settling reservoir below the mine do their work well. The matter carried over the dam in suspension is less than 1 per cent. All the rock and sand is effectively stored, none of it reaching Spanish creek. The sediment carried in suspension is an extremely fine, impalpable substance not calculated to do any injury to either lands or navigable streams. The company is acting in the utmost good faith; its method of working is eminently successful. They have a fine bed of gravel, and it is believed to contain much gold.

THE PRONAR.—This mine, at Grass Flat, is paying well. Thistle Shaft, below Gibsonville, employs between 50 and 60 men, and is meeting with the usual success. The Slate Creek mine, under the superintendency of Mr. Moyle, has been operating about ten days by means of the elevator process, which is handling the gravel with great rapidity. Several men are working at the Excelsior.

THE NORTH FORK.—The King mine, owned and operated by Fred Scott, is developing into a fine property. Last week the clean-up from the work of four picks in a little more than two days was 18½ ounces of gold, or about \$325. He owns nearly a mile of the Big Flat channel and is working at the lower end of the claim. Not much over 100 feet of the channel has yet been mined, but the yield has been very satisfactory thus far.

Riverside.

The Winchester *Recorder*, in speaking of the mining industry in Riverside county, says more attention is given to mines and mining than ever before. Many think that the sale of the Good Hope mine some months ago is the cause of its revival, others that the absence of other employment has led many to develop old prospects that proved to be richer than at first supposed; yet whatever the reason for this activity, the fact remains that the known mineral resources of the county are constantly increasing.

Work is steadily progressing on the mines around Winchester—the Snowbird, the Alice and others—and their owners have unbounded confidence that they will prove rich producers when developed.

San Bernardino.

The Holcomb Mountain Mining and Milling Company of Los Angeles has a capital stock of \$300,000. Their mines are located in San Bernardino county and are reported rich in placer gold. A carload of machinery was recently shipped.

Plant & Pierce, from San Bernardino, have bought the steam arrastras which were at Old Woman's Spring, and have moved them to a gold mine of theirs near the once famous Green Lead mine.

The Holcomb Valley Company started up their placer works about the 1st of April. The new machinery for amalgamation is working better than last fall, but is not yet as complete a success as could be desired. C. L. Metzger & Co., who have a large number of claims, will commence work in a few days.

The Riversiders have changed their superintendent once more on the Rose mine; Dr. Shugart holds the reins now. Some of the miners think it was time for a change, as they claim provisions were short during the winter.

The Morongo King Company are slowly putting up their ten-stamp mill. This week several carloads of pipe are being freighted in.

A half interest in the Surplus mine in Rattlesnake Canyon has been sold by Mat Morris to Metcalf Bros. The price is said to be \$5000, \$500 of which was paid down. They are running a horse arrastra on the ore from this claim.

Shasta.

A RICH STRIKE.—*Democrat:* R. G. Hart, of the Texas Consolidated Gold Mining Company, says that an immensely rich body of ore has been encountered in the Texas Consolidated in Old Diggins. The strike was made in the lower tunnel—No. 5—last week. The rock in the new discovery assays \$1100 per ton.

ARIZONA.

AT DOS CABEZAS.—*Tombstone Epitaph:* The Casey brothers of Dos Cabezas are in town. They are investigating the cyanide process as it is worked in Tombstone district, with a view to introducing it at their mine. They report a bright outlook for Dos Cabezas. The lessees of the Philadelphia mine are working their ore with good results. The ore continues to increase in richness, and ten stamps are dropping tight and day on the ore. The water supply is unlimited.

At the Silver Cave mine two Crawford mills are rapidly being placed in position to begin active operations.

At the Huntington mill, in Coopers canyon, the work of piping water from up the canyon is going on, and when completed a sufficient supply will have been developed to run the mill night and day.

Tombstone Prospector: Two carloads of leather in bond went over the N. M. & A. yesterday, bound for Joliet, Indiana, where it will be treated before shipment to England. There were 45,000 pounds in the shipment, valued at Gnyamas, where it was tanned, at 12 cents per pound.

George Fitts has received a piece of ore weighing 150 pounds from the Copper Glance mine at Camp Israel, in the Huachuca mountains. It represents a recent strike in the mine, the ore of which is valued at 300 ounces silver, \$15 gold and 47 per cent copper per ton. The camp is commonly called the Salvation Army camp, and is growing into a lively community.

Mr. Eltonhead, whose efforts with electricity and cyanide have met with such pronounced success in Tombstone, has just cleaned up a beautiful lot of amalgam from the plates which he has been using in his experiments. The most gratifying feature of the 20 pounds which he gathered was not in its weight, but in its fineness. It is 990 fine, showing conclusively that in precipitating the gold and silver by the electro process no foreign metal is gathered. The last test made by Mr. Eltonhead was with a 35 per cent manganese ore, from which he saved the remarkable proportion of 95 per cent of silver contained therein.

NEVADA.

Washoe District.

Regarding Con. Cal. and Virginia last week's letter says: On the 1650 level the south lateral drift which entered the ore body at a point 120 feet south from the winze and 14 feet below the sill floor has been extended during the week 7 feet in ore of high grade quality. This extension makes the total length of the drift 25 feet, in good quality ore. The drift has been further extended four feet in quartz and porphyry formation of low assay value.

The ore extracted during the week from this drift, together with some ore of a lower grade extracted from the vicinity of the winze, 52 feet down, amounted to 152 carloads, about 150 tons; the average assay value, per car samples, is \$88.91 per ton.

A west crosscut has been started from the north drift, 28 feet below the 1650 level and 14 feet below the ore cut in No. 2 south drift. This crosscut has been advanced 26 feet. Starting in vein porphyry it changed to a solid body of quartz of low assay value. There are spots that assay well. The south side of the crosscut looks more favorable and a south drift has been started therefrom with favorable indications.

On the 1000 level—the Rule drift—the upraise on the east side of the main drift, at a point 585 feet south from the shaft station, has been carried up 13 feet; total height, 50 feet, top in porphyry, clay and quartz of some value. From this point a north drift has been started and advanced 30 feet in porphyry and quartz. At a point 355 feet south from the main shaft a winze has been sunk 14 feet, and from this point a west crosscut has been advanced 12 feet. All these openings are in quartz, porphyry and clay formation of low assay value. We continue to do necessary repair work throughout the main shaft.

The *Enterprise* says: The crosscut 28 feet below the 1650 level of Con. Cal.-Virginia is progressing as well as could be expected. It is necessarily slow owing to the situation. There is no doubt in the minds of all the experts who have seen the situation but what a continuation of the ore body will be found when the crosscut has reached the distance required. The crosscut 14 feet above this cuts through 24 feet of ore, and it is not known how far above and below the 1650 level this ore body extends, as there has never been any work done in either direction directly above or below this locality.

The south drift on 1465 level of Ophir is in a softer formation of porphyry, showing lines of quartz. A small station has been opened in central tunnel at a point 56 feet at one tunnel, and prospect work will begin therefore in a northerly direction.

The upraise near mouth of west crosscut, 1465 level of Mexican, continues in a very soft porphyry formation showing fine lines of quartz. The Union Con. and Sierra Nevada joint west crosscut on 900 level, near north line of Union mine, is in hard porphyry.

In the Occidental from the west ledge above the 400 level they continue to extract about eight tons of ore per week of the average assay of \$44 per ton.

In the Kentuck the south drift from the east crosscut on the 1035 level is in 26 feet; the face is in quartz, with bunches of pay ore. 1200 level—The south drift from the Yellow Jacket incline is in 76 feet and continues in low-grade gold ore.

West Con. Va. & Cal.—During the past week the west crosscut run from a point 320 feet north of the shaft station on the 1100 level has been extended 30 feet and is now in a total distance of 788 feet. The face is in hard quartzite and the bow of water is unchanged.

On the 850-foot level of Belcher we have

cleaned out and retimbered 50 feet of the main north drift, making its total length 550 feet from the shaft. This drift has now reached the Crown Point line, and we have started a joint drift with that company to the northeast in quartz of a favorable character. A crosscut will be started in Belcher in a few days to the east for the purpose of exploring a body of quartz in this section of the mine. From the old stopes on the upper levels we have hoisted during the week 18 tons of fair-grade ore.

THE GOLDEN EAGLE MINE.—*Reno Journal:* The Golden Eagle mine, which is located five miles north of Reno, is producing large quantities of gold ore. From experiments made by mill process on several tons of the ore it is expected that all the ore from the mine will work from \$10 to \$15 per ton in gold.

The Reno Reduction Works have been leased to work 1000 tons of the ore. Concentrators will be put in the Reduction Works, as also gold saving appliances.

Lyon.

A RICH STRIKE.—*Virginia Chronicle:* A rich strike is reported in the Boston & Lester mine at Silver City. The mine is located near Oest and there is said to be \$10,000 worth of ore in sight. Pollard's mill will go to work on the ore to-morrow, and a \$4000 cleanup is expected to be made.

Nye.

THE NEW GOLD DISCOVERY.—The new gold field which has been discovered in the western part of Nye county, one mile north of Lone canyon, is in a gulch that heads near the summit of the range and washes into the great Lone valley. The country from the head of the gulch out into the valley has been prospected with good results in every case without getting down to bedrock. A correspondent writing to the *Austin Revue* from the new find says: "The range from Lone canyon, north to Gold Park canyon, 30 miles, contains hundreds of gulches in looks equal to Dry Gulch, and the chances are the prospectors will find four gold in them." The extent of the new find cannot be known for months.

BRITISH COLUMBIA.

YALE.—The trial made at Yale last week by Bell & McCastle's gold dredger fully realized the highest expectations of the prospectors. Working in 12 feet of water, gold gravel was pumped up from the bed of the river which yielded 19½ ounces of gold in a 36 hours' run. Stones weighing 25 and 30 pounds are brought up by the pump, and the whole machinery works perfectly.

MONTANA.

A RAUOLAR STAMPADA.—The excitement caused by the recent discovery of the Cayuse, a supposed rich gold mine 40 miles south of Glasgow, Montana, reached its climax last week, when 12 miners came in on horseback from Neilbar and over 50 men arrived from Canada and around Malta.

Fearing the strike would not be declared off, the miners from Neilbar started with a pack outfit. They secured fresh horses and started across the country.

John Cliff, a ranchman living 20 miles north of here, was drowned while crossing Milk river in the rush to get across. He, with others, attempted to swim his horse instead of waiting for the boat. The horses got jammed and he jumped off, and the swift current of the river carried away his body. The accident did not seem to put a damper on the others, for they rushed on to the gold fields.

The trains are bringing in large delegations of miners from Helena and Great Falls. From an old map of Kies the fact is developed that this was the old camp.

Everybody has thrown up his position to get a claim. Dan Sullivan, county jailer, has resigned his lucrative position to run a saloon at the mines. The miners have named the diggings Alexander City. The distance from Glasgow is 40 miles.

OREGON.

GRANT'S PASS COURIER: R. M. Kelly and W. J. Strong are doing development work on their copper ledge near the State line, six miles south of Waldo. The ore, of which there is an immense body, assays \$24 in gold, 17 per cent copper and \$12 in silver to the ton.

At both entrances to Tunnel Nine a huge vein of black quartz, resembling coal, crops out all the way along the tunnel, and there are large dumps of the ore at both ends. An expert, employed by J. C. Lewis, puts its average value at \$80 per ton. His is not the ordinary method of ore extraction, but a combination of chemical and liqnefying processes. Fifteen claims have been staked out in the immediate neighborhood, and the black vein has been traced over a wide area.

Three giants are running continuously on the Hampton-Lewis placer on Grave creek. The large force of men needed on the ditch construction has been paid off and the crew consists of ten hands. The ditch, which is 16 miles long, leaks more or less its entire length, as the blasting loosened the embankment dirt, so water will not be very abundant this season.

JACKSONVILLE TIMES: E. E. Miner & Co. are down 120 feet by their shaft in the Dardanelles mine and have run a drift in ten feet, where they have struck a ledge four feet wide, of decomposed rock. There are 150 tons of ore on the dump which assays from \$8 to \$50 per ton.

SOUTH DAKOTA.

GOLDEN REWARD CHLORINATION.—Black Hills Times: Herein is a brief description of the above method in use at the Golden Reward works in Deadwood, S. D. Before treating the ores they are assayed to find out their value in gold, then analyzed to determine the degree of heat and length of time required to roast them, also to determine the proper quantity of the different chemicals required to insure perfect results. All this is determined in the laboratory, after which the ore is pulverized fine

enough to go through a No. 8 screen. It is then roasted in Bruckner and White and Howell roasters. After roasting it is spread on the cooling floor, being assisted by the application of water. When sufficiently cool it is conveyed to the steel barrels, which are charged with the proper proportions of ore, chloride of lime, sulphuric acid and water. The barrels are then closed tight and revolved for the length of time which the previous analyses have determined to be needed. The chloride of lime, sulphuric acid and water generate chlorine gas, which, acting on the ore, dissolves the gold. The barrels are then stopped, water added, and the solution is filtered direct from the barrels into large settling tanks, where any remaining slimes left in the solution are settled. When the solution is clear it is pumped into the precipitating tanks, the free chlorine is driven off by the use of sulphuric acid gas, and the gold precipitated by hydrogen sulphuric gas. When the precipitation is complete the result is a mass of gold sulphides, which are then run through filter presses, the press retaining the gold sulphides and expelling the waste solution. Every week the gold sulphides are taken out of the press and roasted to expel the sulphur, then mixed with fluxes and melted into bright yellow golden bars, ready to be coined into golden eagles. The Golden Reward works, by the above described process, treat 100 tons of ore daily.

A CYANIDE SUCCESS.—Deadwood Times: The cyanide plant is now in full operation and all machinery adjusted, the Cornish rolls crushing the ore to 30 mesh. The movement of the rock is entirely automatic from the time it enters the mill from the ore bins to the bin containing the finished product. It is first broken in a powerful rock crusher, passing from it to the Bowers patent rolls (concave and convex), from which the pulp is carried up to a three compartment screen, then descending to the other sets of rolls, where the coarser particles are reduced. It is then again elevated to another revolving screen (steel 28-mesh), from which the finished product passes into the storage bins, loaded into cars and placed in the steel vats and leached with the proper solution. The works have now a crushing capacity of 50 tons per day. From the success attained by the company in the treatment of certain classes of Black Hills ore, there is no question but that they will soon have to double the present capacity of their works. The mines now owned by the company are fully capable of keeping the mill supplied, but in order to show the practicability of the method and its suitability, the management reserve a portion of the present capacity for the treatment of custom ores.

WASHINGTON.

Okanogan Outlook: The Bridgeport Mining and Milling Co. will equip their mine with a complete steam hoisting plant, consisting of a 60-horse power boiler, one Clayton air compressor, one hoisting engine, a sinking pump and two Ingersoll-Burleigh drills. They have also purchased a sawmill and will cut their own timbers and lumber for building purposes. They also propose to continue the development of the Columbia mine at the point where the work was done last season. The shaft, now down 150 feet, will be continued to at least the 300-foot level, and from this point drifts and crosscuts will be run to determine the width and length of the ore chute, and to tap the other veins which run parallel to the one on which the shaft is being sunk.

The placer mines on the Similkameen continue to yield a paying quantity of the yellow metal and new locations are being made every day.

The stamp mill recently erected at Camp McKinney is now running on ore from the McKinney mine. The ledge on this property has been prospected to a depth of 75 feet in several places, and the ore is invariably rich, in much of it the gold being free and plainly visible to the naked eye. About 15 men are at work on this property.

The Union Gas Engine Co.

The rapid advance of the gas engine within the past five or six years, and the strong hold that it has gained on the confidence of those who use motive power, is largely due to the ingenuity and energy of this company. From its swaddling clothes or creeping stage, as one might say, it has been brought by this company to full fledged manhood.

Where at one time, and but a few years since, it was regarded by many as quite improbable, if not impossible, that any high degree of power would be attained by these engines, it has been fairly demonstrated by the Union Gas Engine Company that a high rate of power can be furnished through this means, and at less cost than by the use of steam. While the engine has passed its experimental stage, and is now practically a perfect motive power, it is still the policy of the company to improve and adapt it to every possible requirement that it may be called upon to meet. The long list of names of those who are using the Union gas engines, both for marine and stationary purposes, is the best evidence that can be offered that the company's efforts have met with success. Whoever is in need of power, either for pumping, mine hoisting, propelling boats or anything else, should not fail to send for the finely illustrated catalogues giving full particulars. Address the Union Gas Engine Co., 221-223 First Street, San Francisco, Cal.

Coast Industrial Notes.

—Horses are being shipped from Union, Oregon, to Scotland.

—Two stamp canceling machines, with a capacity of 30,000 an hour each, are run by water power at the San Francisco post-office.

—The Bodie Gold Brick Consolidated Mining Company was incorporated yesterday. Directors—Charles Roberts, C. M. Sawyer, D. T. Meagher, R. H. Campbell, Martin Jones. It is understood Mr. Meagher is responsible for \$9,998,000 worth of the stock; each of the other directors has subscribed \$500.

—The Fulton Engineering and Shipbuilding Works, of this city, have completed and put in successful operation a new pumping plant for the Spring Valley Water Company at Black Point. The pumps will deliver 300,000 gallons of water to a height of 400 feet and are well adapted in every way to the important work.

—The understanding between the Panama Railroad Company and the Pacific Mail Steamship Company, by which the railroad company chartered the ships of the steamship company temporarily on the Atlantic side and ran them between Colon and New York under the name of the Columbia line, is at an end, and on June 15th the railroad company will put on other steamers.

—The construction of a tunnel to drain Humboldt lake, for the purpose of utilizing the water for irrigating the arid land in that vicinity, has begun under the direction of Southern Pacific engineers. The *New Era* says: The intention seems to be to drain a sufficient area to redeem 10,000 to 15,000 acres of land. By the end of the month twenty men and six teams will be engaged on the canal.

—“We are in no hurry to start up again at Roslyn,” said Manager Lytle of the Northern Pacific Coal Company when asked in regard to the situation at Roslyn, Wash. “At the meeting when the men refused to go to work at the new rate there were 46 votes cast in favor of accepting the reduction and 220 against. We have about 600 miners at Roslyn, so that the majority were ‘on the fence’ on the proposition. I guess we could open to-morrow if we wanted to, but we are in no hurry. The situation will remain as it is for about two or three weeks.”

—Articles of incorporation of the Overland Pacific Railway have been filed. The corporation will connect Fort Bragg, Mendocino county, and the Mount Vernon coal mines with railroad and telegraph lines. The new road will be built by way of the town of Willits, with a branch line from Willits to Ukiah. The directors are Barclay Henley and T. L. Johnson of San Francisco, Calvin Stewart of Fort Bragg, G. W. Hunt of Walla Walla, Wash., and R. S. Straban of Portland, Or. The capital stock is \$2,510,000, of which Directors Henley and Johnson have subscribed \$54,500 each, Director Hunt \$800, and the other directors \$100 each.

—The following are recent new incorporations:

Coast Development Co., San Francisco. Capital, \$50,000.

Pacific Stethophone Co., San Francisco. Capital, \$600,000.

Latham, Schroeder & Co., San Jose. Capital, \$30,000.

Artesia Drug Co., Hanford, Kings county. Capital, \$10,000.

Yellowstone Mining Co., San Francisco. Capital, \$100,000.

Ukiah Mutual Building and Loan Association, Ukiah. Capital, \$1,000,000.

Kern County Fruit Exchange, Bakersfield. Capital, \$25,000.

Teredo-Proof Plie Company, San Francisco. Capital, \$100,000.

North Stockton Improvement Co., Stockton. Capital, \$15,000.

Riverside Abstract Co., Riverside. Capital, \$62,000.

San Diego Co-operative Manufacturing and Mercantile Association, San Diego. Capital, \$100,000.

California Ground Electric Co., San Francisco. Capital, \$100,000.

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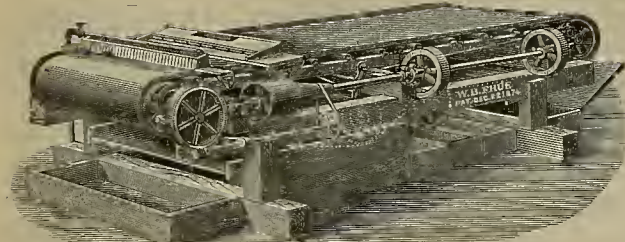


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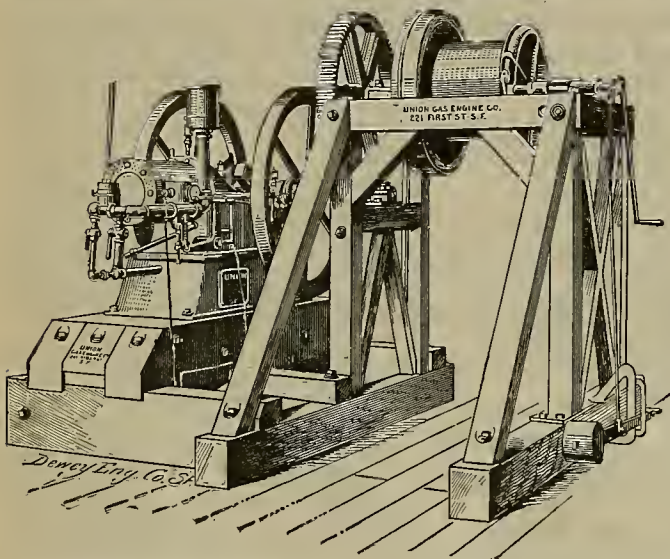
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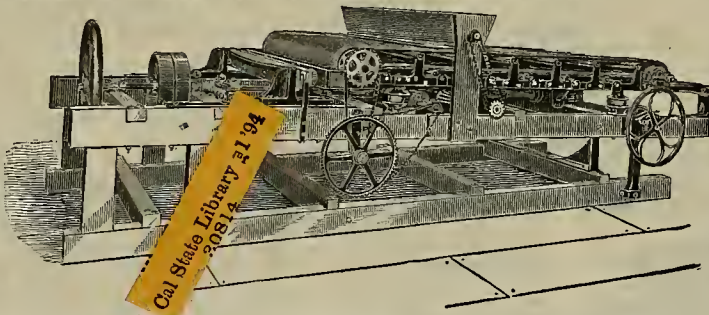
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Samples of pulp and tailings, taken every hour, dried, mixed and assayed, show * * * from West ledge, a saving by your concentrator of 94 1/2 per cent; from East ledge, * * * a saving of 92 per cent.
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Number 21.

SAN FRANCISCO, SATURDAY, MAY 26, 1894.

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The Miners' Drilling Contest.

"Miners' Day" was celebrated at the Midwinter Fair last Tuesday. The principal event of the day was the drilling contest, at which \$1000 in prizes were awarded. The rules of the contest, heretofore published, were observed, and considerable interest was manifested. The judges were G. W. Grayson, Aug. H. Schnabel, Chas. F. Hoffman and Felix Chappelet. Lieut. A. M. Hunt was the timekeeper. This was the first rock-drilling contest on the Pacific Coast. At the Denver contest last year the

world's best contest was made, D. L. Jones, of Colorado, holding the single-hand record, by sinking a hole eighteen and eleven-sixteenths inches deep in fifteen minutes. Page and Reagan, of Butte City, Montana, held the double-team record, drilling twenty-nine and fifteen-sixteenths inches in that time. Ahern and Rinker, of Denver, beat that time, they drilling a hole thirty-one and three-eighths inches in fifteen minutes. Mr. Ahern had the record of drilling single-handed eighteen and three-eighths inches in fifteen minutes. He, John Coan and E. F. Durham entered for the single-hand prize. The other entries in that contest were A. Phillips, of Sutter Creek, Amador county, G. J. Martin, of Amador, and G. M. McGowan, of Silver Creek, N. M. The drilling began at four P. M. Spots were marked on the granite blocks where the holes should be drilled, and positions were taken by drawing numbers from a hat. Platforms were built flush with the granite, to make the conditions as natural as possible.

E. F. Durham, of Grass Valley, took the first prize of \$200, and the world's championship, drilling a hole nineteen and thirty-one-thirty-seconds inches in fifteen minutes. T. J. Ahern, of the same place, drilled nineteen and nine-sixteenths inches and took second prize of \$50, both he and Durham breaking the former record.

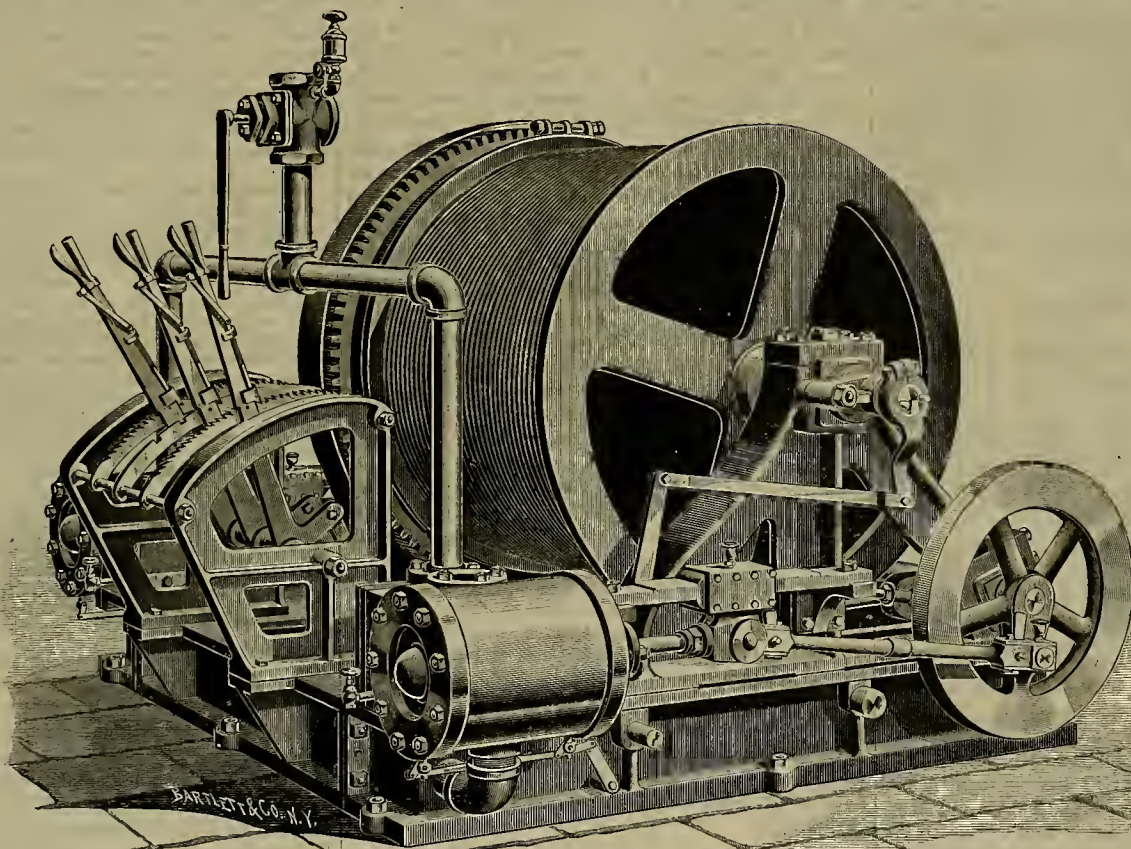
In the contests for the double-team drilling, John Kitto and Sam Harvey, of Amador, put a hole down thirty and twenty-one-thirty-seconds inches and took first prize of \$200. P. Feeney and J. Lynch, of Grass Valley, took second prize, drilling twenty-seven and five-thirty-seconds inches. Messrs. Coan and Jefford, the third team, drilled seventeen inches.

In the triple-team contest, Messrs. Jordan, Kennedy and Woods, of Grass Valley, worked a few minutes and quit, not having practiced together. Messrs. Dingle,

Kitto and Harvey, of Amador county, put a hole clear through the forty-inch block of Rocklin granite, and had about two inches started on a second hole when their quarter of an hour was up. They got first prize, \$300. Messrs. J. Feeney, P. Feeney and J. Lynch, of Grass Valley, drilled almost through the forty inches of granite in the fifteen minutes, and took second prize of \$150.

The prizes were all paid immediately at the close of the contest.

DURING the twenty-five years since the completion of



COMBINED PATENT FRICTION DRUM AND BRAKE AND REVERSIBLE LINK MOTION HOISTING ENGINE.

the Central Pacific and Union Pacific railways there has been brought across the continent to this city by rail 1,573,700 people. During the same period 1,036,600 were carried Eastward.

NEARLY \$25,000,000 in gold has been shipped to Europe since April 1st, and Secretary Carlisle talks of issuing another block of bonds—to get more gold to go to Europe. The Secretary, as long as he is there, can issue bonds just as fast as gold can be shipped away. It's a big thing—for the shippers. Of course, there's no business about it, but, then, there isn't much business about anything that Mr. Carlisle does, so far as the Government's interests are concerned.

THOUGH early to discuss the benefits derived from the Midwinter Fair, yet it is evident that the exposition has had a beneficial effect on our mining industry. Our local manufacturers and others have made good exhibits; the display of the several counties has been complete, and practical results are directly traceable to what has been seen and learned by the admirable exhibits of our mineral resources and mining machinery.

Hoisting Engines for Mines.

The engraving shows a combined friction drum and brake, and reversible link motion hoisting engine, with spirally-grooved drum, built by the Lidgerwood Manufacturing Company, 96 Liberty street, New York City, specially adapted for mines, inclines, etc.


This is a combination for either double or single compartment shafts or inclines, as it unites the qualities of the reversible and friction-drum engines. In a single shaft all the hoisting of ore, etc., may be done by the engine in the

usual way, and the empty car and cage, or bucket, lowered by means of the brake; while for hoisting and lowering the men the drum may be thrown into gear and the engine used as a reversible engine, handling the load by steam. After starting the load the link can be hooked up, cutting off the steam at any point of the stroke desired, thus doing most of the work by its expansion in the cylinders; while in lowering by means of the friction drum and brake the engine does not run and of course uses no steam. A special feature of this style of engine is that while designed mainly for single-shaft work it can also be used for a double shaft by simply throwing the friction into gear permanently and using it as a regular reversible link motion

engine, hoisting load and cage in on shaft and at the same time lowering the empty car and cage in the other shaft. The reversing, friction and brake levers are all assembled in a rack in front of the engine and operated by means of thumb latches, with notched quadrants, so that they will remain wherever placed. This arrangement of levers makes it easy for the engineer to operate the engine quickly, safely and without fatigue.

By an almost unanimous vote the Miners' International Congress in session at Berlin has resolved that mine proprietors should be held responsible and be liable for damages for every accident to any mine employe while at work in or around the mine. The British delegates opposed the resolution. The vote was a mistake. Where disaster results from bad management, insufficient or defective appliances, etc., the owners should be responsible for damages; but where carelessness or foolhardiness results in accident or death, the owner should be held guiltless. Of all places on earth, a man in a mine must look out for himself, and others, too, to prevent accident, and constant care alone can prevent loss of life or limb.

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Half inch (1 square).....	1.00	2.50	6.50	22.00
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MINING NOTICES.

Assessment Notices.....	\$10.00
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Our latest forms go to press on Thursday evening.

Entered at the G. F. Postoffice as Second-Class Mail Matter.

San Francisco, May 26, 1894.

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Australasia's Gold Output.

The official returns of the output of gold in Australasia give the following results for last year and for the four preceding years:

	1893.	1892.	1891.	1890.	1889.
Victoria, ounces.....	671,125	654,466	576,399	588,680	614,839
Queensland.....	616,940	606,612	661,641	610,687	743,209
New Zealand.....	226,811	237,592	261,996	193,193	233,211
New South Wales.....	179,288	166,870	153,336	127,460	112,948
Western Australia.....	110,590	69,518	30,311	34,209	16,493
South Australia.....	33,820	38,974	28,700	24,831	20,030
Tasmania.....	37,587	43,478	48,769	20,610	33,050
Total Australasia.....	1,876,562	1,795,130	1,651,161	1,699,360	1,739,750

UTAH'S chances to be the forty-fifth State are increasing. The House bill providing for the admission of the territory to Statehood was favorably reported from the Senate Committee on Territories on Thursday, and was placed upon the calendar. The bill directs that the election for a constitutional convention be held on the Tuesday after the first Monday in November, 1894; that this convention shall meet on the first Monday in March, 1895, and that the constitution framed by the convention shall be voted upon, and the election of State officers and members of the State Legislature under it shall be held on the Tuesday after the first Monday in November, 1895. It is considered probable that the bill will pass both houses this session.

A BILL has been introduced in the House amending the act incorporating the Maritime Canal Company of Nicaragua. The bill provides that the stock of the company shall consist of 1,000,000 shares at \$100 each. The Secretary of the Treasury is to subscribe for \$70,000,000 of the stock of the company, and pay for it at par by the issue of United States notes. The stock so issued shall be full paid and non-assessable. Six million dollars of the stock is to be issued to the Government of Nicaragua, and one-half million dollars of stock to the Government of Costa Rica, according to the terms of their respective concessions heretofore made. Of the remainder of the stock (\$22,500,000), \$7,000,000 is to be issued to persons and corporations designated by the company, and the remainder of the stock is to be deposited in the treasury of the company until Congress shall decide whether it desires to purchase it. In consideration of this act the company is to call in and cancel all the stock heretofore issued. To secure the proper application of the money authorized, the incorporating act is so amended as to provide that the board of directors of the canal shall consist of eleven persons, eight of whom shall be appointed by the President.

An Object Lesson.

Though England produces no silver, nor her colonies to any appreciable amount, yet the silver question has such extensive connection with commercial affairs that English interests are alert to existing and probable conditions should English policy continue to dominate and compel the continued demonetization of the white metal. The fact that the United States continues to take its policy from England and that New York and Washington wait to see what London wants before obeying the high behest does not alter the workings of natural law, which like gravity is a constant force.

If there is one thing more than another in which England considered it had a monopoly, it is tin. England suddenly discovers that it has serious competition, and that the present low price of silver is an important factor in a present pressing problem. In '87 the production of tin in the Straits Settlements was 23,814 tons; in '93 it was 39,944 tons; in '87 the average price paid to the Chinese miners there was \$486 per ton; in '90, \$554 per ton; in '93, \$634 per ton. Up to two months ago—our latest advices from there—the Chinese miner was getting \$649 per ton for his tin.

These figures show that since '87 the production of tin in the Straits Settlements has increased about 70 per cent, and the still more startling fact (from an English standpoint) that, notwithstanding the unusually low price for tin in London, the Chinese miner in the Straits Settlements is to-day getting nearly 18 per cent more for his tin than he was four years ago, in the face of the fact that the English tin miner is now getting twenty-eight per cent less for his tin.

The explanation is in the relative value of silver. The rate of silver fixes the rate of exchange; silver is way down as compared to former years; so is the rate of exchange, which is now 2s. 0½d. per dollar, and the tin mine owner in the Straits Settlement is in clover like unto the clover that it was predicted at the last presidential election we would be in here. Every pound sterling sent him now nets him ten dollars; in '88 it only netted him six dollars. The farther silver drops the lower the rate of exchange; the lower the rate of exchange, the better for the tin men in the Straits Settlements; the better for the tin men in the Straits Settlements the worse for the tin men of England. It means utter ruin to tens of thousands of English families. There are other things besides chickens that come home to roost, and English mining interests are very much disquieted as they realize the facts here briefly sketched, and which are portrayed at length in the London *Mining Journal* and other reputable sources, and the worst of it is that, no matter how low adverse British and American legislation may force silver, the lower the better for England's competitor in mining tin. Were silver to drop to a shilling an ounce, the Straits Settlements could still sell tin in London at one-third the present price of tin and make a profit.

These facts constitute an object lesson. It may be that their realization will compel the foreign power to which our country's present masters bow the knee in humble though blind adoration, to change its tactics. If so, of course, the United States will hasten to follow suit. The matter has long since ceased to be a question for college professors to determine, and now, when the low price of silver is threatening the commercial supremacy of our most formidable business rivals, self-preservation may impel her to move in the rehabilitation of that precious metal.

DELEGATE JOSEPH of New Mexico has introduced a bill to authorize the exploration and purchase of the mines within the boundaries of private land claims in all Western States. The bill, if it becomes a law, will give any citizen of the United States qualified to make entries of public land the privilege of entering upon any territory embraced within any land claim confirmed by the Court of Private Land Claims and in taking up a mineral claim. Before making such claim the locator must tender the owner of the land \$2.50 per acre for it.

THE New York and Boston newspapers say that the banks are doing all that they can to continue the run on the \$100,000,000 gold reserve, to induce another issue of 5 per cent bonds. 'Tis probable that such result will come about independently of any action the banks may take. Under present conditions depletion of the country's gold goes on in accordance with the operations of natural law. At present the banks of this country can neither help nor hinder the foreign gold drain.

It is believed that when the Mendocino county coal mines are tapped as proposed, by the Overland Pacific, a good quality of steam coal can be laid down here for less than \$4 a ton, which would be a boom to local manufactures.

Gravel Formation.

A Nevada correspondent writes from Reno disputing the ordinarily accepted theories of ancient river channels. He takes no stock in the old river channels. He says he has studied this matter during the course of a long and active life and is of the firm belief that "there is not an underground ancient river channel on this continent." He continues:

I find in going east and west on the different ridges that the bed-rock keeps changing and each stratum has its own peculiar character of gold and gravel, for I have followed them for miles in a northerly and a southerly direction from ridge to ridge. All mineral in belts, as the great slate range of California, is put up in this way, averaging from 1000 to 1500 feet. Men who went up to the Frazer river in response to inquiries about the slate belt told me that the river ran through granite until it came to a bend, where it turned northerly where Thompson river came in, and on Thompson river was slate rock and the first coarse gold that they found. I came to the conclusion that it rises north, nobody knows where, until it comes to the great bend and then through granite to the coast. It evidently comes from the north and keeps between the granite and slate; then the slate belt runs south until it goes into the ocean.

The theory of primary formation is thus elucidated. This earth was once a globe of fire; the waters were a mist and only settled as the earth cooled, and the primary rocks formed in a line in a northerly and southerly direction for a period of time and then there was an eruption. Then came the second cooling and the formation of the secondary or the light-colored rocks and the mineral formation; then primary rocks being shattered into fragments, large masses formed mountains, and small fragments all floating, and thus was formed the boulders, like throwing particles of ice into water. The corners would melt off first and form round, smooth boulders; and as the waters settled, they had the action of the heat and the water combined, for the water covered the whole earth, and all these gravel deposits were formed under the ocean instead of ancient river channels. I believe in the theory that all mineral is held in solution in the ocean, and it would be natural for the mineral to settle first, that being the heaviest; and the heat being greatest in the fissures, and attracted by the heat, the mineral and quartz were deposited and formed ledges, and the heat being so great, the ledges practically melted down and with the action of the water formed the beds of gravel as we now find them. That is the way I account for the large nuggets of smooth gold deposits that we find all over the country. In ledge mining one does not find nuggets of smooth gold.

A mineral belt is the same character of rock, running through the country, and in general has three distinct veins, but one always takes predominance over the others and this one sometimes will hold nearly all the mineral. This occurs in gravel mining as well as in ledge mining.

As one goes east and west the character of the gravel changes, as well as the gold and bedrock from ridge to ridge. I don't want to be understood that the pay gravel is continuous. It is frequently cut off by the hard rock or primary rock; for sometimes a good lead will be cut off or rimmed with the hard rocks. It is, therefore, sometimes cheaper to take them in the end and follow them in than to cut through the rim rocks. My old stamping ground for a good many years was on Liberty Hill, Nevada county, near the Hornblende range, which always produces coarse gold, as at Forest Hill and other places. This belt takes more the form of basins than the slates proper, as is the case mostly with the granite belts; that is, the granite belt gravel deposits are generally in basin form. I don't go a cent on ancient river channels. Maybe some time in the next century what I have written can be proved to anybody that will investigate. I know it is hard to get over what geologists teach, but men learn sometimes by experience things that are not in books.

This matter has been thoroughly argued, and though it is not likely that the verdict will be ever unanimously accepted as definite, it is well established that the ancient river channel theory accords better with existing facts than any other one advanced, and approaches the exactness of a mathematical demonstration.

An Opportunity for Inventors.

The commercial value of an idea would be considerable to the clever inventor who can devise a durable wheel for an electric car. A cable-car wheel will last a little over a year, but there is no determining with any certainty how long a wheel will last when used on an electric railway operated by the trolley system, where the electricity goes back to the power-house through the track. A comparatively new wheel will be found to be devoid of rim or edge while its companion wheel, put on the same day, will be as good as the first time it revolved. No one has been able to find out the reason or remedy for the singular defect. Keen wits are at work on the problem; there is tremendous loss by reason of the present imperfection, and tremendous gain to the man who can remedy the existing defect in the system.

Our Mineral Resources.

The mineral product of the United States for 1893 aggregated in value \$609,586,083. Of this the non-metallic product is \$358,604,217 and the metallic, \$249,981,866, leaving \$1,000,000 unspecified. This is the smallest for five years, and is \$75,000,000 less than the previous year. Petroleum gained \$3,000,000 in valuation; gold gained \$2,950,000 in the value of the product, as compared with the preceding 12 months; silver gained \$2,585,857, taking its coining value as the standard; copper decreased in production 16,000,000 pounds and in value \$5,985,478; lead decreased about 50,000 tons and \$5,000,000; zinc decreased about 9000 tons and \$3,000,000; aluminum increased 80,000 pound and \$94,000; nickel fell off about 50 per cent in quantity and value.

General Mining Notes.

LAST month's yield of the Utica and Stickle mine was \$347,000.

THE Eagle Bird mill, near Nevada City, Cal., is to be started up again.

SUPR. WILSON, of the Elkhorn Mining Company, reports that the profits for April were \$14,691.

A ton of ore has been struck in the Spotted Horse mine, Montana, some of the ore running \$3000 to the ton.

THE Tamarack Copper Mining Company has declared a dividend of \$4, payable June 20th, making a total of \$3,870,000.

THE North Star Mining Company will increase its capital stock from 100,000 shares of \$1,000,000 to 200,000 shares of \$2,000,000.

MINERS, it is said, are offering their services for \$1.50 per day at several camps in southern Yavapai, Arizona, reports the *Journal-Miner*.

THE National Lead Company has declared dividends of one per cent on common and 1½ per cent on preferred stock, payable June 15th.

A ROCK weighing \$500 was recently received at San Quentin from a quartz mine at Los Tules, Lower California, the result of a few days' run.

THE Boston & Montana Consolidated Copper Mining Company has declared a dividend of \$1, payable June 28th, making a total of \$2,225,000.

THE Omaha Mining Co. has declared a fifteen-cent dividend, its twenty-sixth. Superintendent Mainhart says the mine looks fine. It is a good property.

THE ocean beach near Ocota, Washington, is reported alive with men and boys panning out flour gold from the sands. They claim to be realizing something worth while.

PLACER mining on the Similkameen has been suspended by reason of the spring rise. There may be more gold taken out of the swift river this year than for 30 years past.

FROM Cripple Creek, Col., is reported a discovery of sylvanite ore at a depth of 85 feet, which runs \$150 to the ton. About 100 pounds were taken out. The vein is from two to four inches thick.

A RICH strike is reported from the New Brunswick gold mine in Blacktail park, fifteen miles south of Butte, Montana. Some of the quartz taken out at a depth of sixty feet is said to assay \$18,000 per ton.

THE *Denver Record* says: "Placer mines along Clear creek near Golden are washing out from \$1 to \$4 per day per man. The crudest methods known to placer mining are used in obtaining the gold."

IN the *Culinary Engineer*, Prof. Lakes says that a resurrectionist would have a profitable profession in West Africa, for there are millions of pounds worth of gold buried in the graves of chiefs and principal men.

DOING the last year Arizona has made greater progress in the output of gold than it has in the previous ten. Now it begins to look, says the *Journal-Miner*, as if the yield for 1894 would amount to \$5,000,000.

IN Gold Field, 40 miles easterly from Phoenix, Arizona, Hall & Sullivan are running their 20-stamp mill on Mammoth ore, and turning out \$50,000 per month. This mine was reported to be a fake about a year ago.

KINZIA LANNIE, an old-time assayer and mill man, is in Spokane, where he has just completed the smallest gold mill ever made in the West. The complete outfit weighs 40 pounds and the millsite is a big arm chair.

SUPR. CLARK of the Poorman mine, Idaho, wrote the board of directors that he had effected changes in the treatment of the ore that would cause a saving of \$5 per ton, whereupon they rescinded the recent assessment.

A BILL has been introduced in the Legislature of Ontario, with a very reasonable show of its passage, exempting from Government royalty forever all mineral locations made in the province for the next five years.

THE question that puzzles the Colorado *Mining Gazette* is, How the Georgetown Coney Home Reserve fellows figure that the issuance of \$500,000,000 in irredeemable Government bonds will benefit the silver miner?

THE Utica and Stickle mine has what are believed to be the largest chlorination works in the world—five furnaces of 22 tons capacity per day. The cost to reduce the sulphurets to bullion bars .22 fine is placed at \$5.50 per ton.

DIACROTA PASTON of the United States Mint estimates the world's production of gold for 1893 at \$152,439,207, of which the United States contributed nearly \$36,000,000, Australia and South Africa following in second and third positions.

AN Arizona paper says: "The time is now ripe for the yearly discovery of rich gold rock on the desert hundreds of miles from water. Beware of the desert finds in summer and the discovery of rich mineral in the ice-bound mountains in winter."

W. C. RALSTON and associates are running the Quincy hydraulic mine in Plumas county. A gold bar valued at \$2080 was received this week, being a one-third cleanup of an eighteen-days run. This is believed to be the largest hydraulic mine now running under the Caminetti law.

THE James Kennedy group of gold mines at the camp of Kennedy, Humboldt county, Nev., have been sold to a San Francisco company, represented by Jim Wardner, of Coeur d'Alene, for \$75,000. A 20-stamp mill will be erected within 60 days. One hundred and twenty miners are now there.

THE receipts of gold at the United States Branch Mint at Denver for May up to the 10th inst. show an increase over the same period of 1893 of 400 per cent. The gold received from the stamp mills and placers, in the form of nuggets and retort, gives an increase of 137 per cent, showing that the greater increase comes from the smelting product.

THE famous Gwynn mine of Calaveras county, a gold-producing property which has a record of having paid its owners something above \$2,000,000 in dividends, is soon to be reopened, says the *Stockton Independent*, by capitalists who are confident

of restoring the mine to its place among the leaders of the State. The mine is located on the Mokelumne river, about 60 miles from Valley Springs. The property is now in the hands of a corporation formed to work it, and is held under a contract of purchase which gives the company two years to pay for the mine. The purchase price is \$200,000, and the deed is in escrow.

THE recent average battery assay of the Hale & Norcross ore milled at the Brunswick mill (749 tons 769 pounds) is reported to be \$18.15; percentage obtained of the average battery assay, 89.24-100 per cent. The standard value of the bullion yield of this ore is: Gold, \$4077.80; silver, \$8059.46; total, \$12,137.26, the net value of which, melting charges deducted, is: Gold, \$3916.91; silver, 6233.49 100 fine ounces.

THE Mgalia gold mine in Butte county is about to pass from the hands of N. D. Rideout into the possession of a stock company capitalized at \$1,000,000. The subscription books open at the Anglo-California bank to-day. Col. Frank McLaughlin will be general manager, and as an investment the enterprise is looked upon with favor. Gov. Markham, Henry T. Scott, I. C. Stump, Jas. L. Flood and other prominent men will act as directors, when the allotted number of shares—60,000—are subscribed for. Mr. R. M. Higgins, the secretary, room 1, ninth floor, Mills building, can furnish all required particulars.

REOAUINO the Con. Va., the *Enterprise* says that the bonanza development below the 1650 level shows it to be even better than has been represented, especially in the lower south drift, 28 feet below the level or 14 feet below the original bonanza drift. The first two feet of the lower drift from the west crosscut were in low-grade ore, but the last 19 feet passed through ore averaging \$60 per ton, and the face of the drift shows ore worth over \$100 to the ton. There is every reason to suppose from the character of the ore and the vein itself that it will extend twice as far south as that in the upper drift, as it shows great strength besides being fully as rich, assays going as high as \$500 and \$600 to the ton. It is a continuation of the ore body above, and how far it extends downward has to be found out.

THE following are recent mining incorporations: The Bear Lake Consolidated Mining Co., limited liability, at Victoria, B. C. Capital stock \$500,000, with shares at \$5 each. Incorporators—G. Riley, G. Leiser, M. Gutmann, G. Hunter and G. Nowell.—The Civil Service Gold Mining Co., at Boundary City, Wash. Capital stock \$100,000, with shares at \$1 each. Incorporators—Wm. M. Pinkston, W. W. Davy and B. F. Budd.—The Hope Extension Gold Mining Co., at Basin, Mont. Capital stock \$400,000. Incorporators—A. H. Mitchell, W. Mackey, G. H. Tong, L. Eaves, E. A. Nichols and C. E. Gable.—The Styne Creek Gold Mining Co., limited liability, at Vancouver, B. C. Capital stock \$200,000, with shares at \$3 each. Incorporators—R. C. Campbell-Johnson of Vancouver, J. H. Anthony of Lytton and N. P. Snowden of Victoria.—The Mountain Lion Mining and Milling Co., at Grant's Pass, Oregon. Capital stock \$10,000. Incorporators—A. M. Brown, J. W. Farquhar and Geo. H. Rivers.

Our Cup of Gold.

With a beautiful reference to the Biblical story of Joseph and his brethren, Thomas Starr King once spoke of California's "autumn sack" as "stuffed with grain, while the month of it contains a cup of gold."

IN this striking metaphor, says the *Bulletin*, the eloquent orator associated the two great industries of the State—agriculture and mining. The autumn sack will not this year be greatly distended with grain, but the cup of gold from the mines will be larger than it was in 1893, when the wheat harvest was hountiful.

THE gold product of the State is likely to show an increase of \$2,000,000 this year. Last year it was about \$12,500,000. The output of the yellow metal for 1894 will at least be \$14,000,000, if the present rate of production be maintained.

THE year has witnessed a genuine revival in quartz mining. This applies especially to Calaveras county, where the wonderful richness of the Utica mine has made almost any sort of fair prospect salable at a good price. Many mines in the neighborhood have been doubled in market value by the developments in the Utica.

THIS remarkable mine has for some time been the chief gold producer in the State. It has this year doubled its yield. Its monthly product is about \$200,000. Last year it turned out \$100,000 a month, and that was regarded as a great yield. It is said, on good authority, that recently the mine turned out \$200,000 in a run of six days, which is at the rate of \$1,000,000 a month.

THE Utica is owned by Alvinza Hayward, the Hohart estate and Mr. Lane. This is strictly a private property, and it is scarcely necessary to say that there is no stock of the company for sale. In fact, while the output of the California gold mines continues to run well up into the millions, there is no stock gambling connected with any of them at this time. Even Bodie stocks are now little subject to Call Board speculation, though the district is still productive, its annual output being in the neighborhood of \$300,000.

WITHIN a year a number of French capitalists, composing the La Grange Mining Company, have invested nearly \$1,000,000 in Trinity county. The company recently bought what is known as the Hayes mine, consisting of half a dozen gravel claims strung along the Trinity river for a distance of two miles. The price paid is said to have been \$185,000. The property includes a ditch carrying 2000 inches of water. Not content with this large supply, the company is constructing another big ditch at a large cost. The company is operating with good results what used to be known as the Loveridge mine. As the debris from the washings is discharged into the Trinity, thence flowing into the Klamath, which empties directly into the ocean, there is no restraint on its operations through fear of damages to agricultural lands. For this reason hydraulic mining in Trinity county is flourishing, while on the watershed of the Sacramento the industry has diminished to but one-tenth part of its former proportions.

CHARLES G. YALE, statistician of the Mint, says that the demand for California gold quartz mines is greater than it has been for the past 20 years. He looks for an increase rather than a decline of the present activity in gold mining.

General News Notes.

RISEING AWEBS wreaked ruin in Pennsylvania during the week.

SENATOR HILL of New York is fixing up a little tariff bill of his own.

IT is expected in the Senate that the tariff bill will be passed before June 15th.

A WOMAN with a baby has "earned" \$15 a day haggling in Golden Gate Park.

GOV. WAITE wants Mexican dollars coined to be used as legal tender in Colorado.

GOVERNMENT VAULTS now contain \$790,826,660; a year ago they held \$756,544,116.

SANATOR JOHN P. JONES of Nevada will shortly issue an address on the silver question.

THE entire town of Manchester, N. J., was sold at auction last Wednesday, in foreclosure of a mortgage.

KELLY says that when he gets to Washington he'll keep off the grass, and deliver a speech from a balloon.

JOHN PRICHARD, superintendent of the Dening mine, near Black Diamond, Washington, was killed by a car last Tuesday.

THE bituminous coal strike still continues. Pennsylvania mine owners intend to employ outside men, and further trouble is feared.

TWENTY-DOLLAR PIECES which have been hollowed out and a plate of brass inserted, are making their appearance in the foot-hill towns.

WHEAT has dropped to fifty-three cents in Chicago, the lowest in seventy years. The simultaneous drop in silver is doubtless "a mere coincidence."

THE American Railway Union is being introduced in Los Angeles and the employees of the Southern Pacific railroad are joining it in large numbers.

AS NEAR as can be figured among the daily fluctuations and amendments in the tariff bill, the probable annual income from the bill will be \$61,977,862, as against \$77,644,188 from the McKinley bill.

ON the 20th ult. there was in European banks \$1,766,100,000 in gold and silver; on the same date last year there was \$1,631,200,000. Of this amount there is \$120,000,000 more gold than one year ago.

HIGH-WATER MARK has been reached on the pension business. From now on the payments will be less. Pensions have taken about forty-eight per cent of the entire income of the Government since July 1, '93.

GENERAL SUPERINTENDENT JAMES E. WHITE of the U. S. Railway Mail Service has decided that all railway postal clerks must accept matter offered them at the cars on which postage has been properly paid.

COGNACUS VANDERBILT and thirty other New York millionaires have opened a loan office. Money will be loaned on personal property for the full value of the goods pledged at the rate of one per cent interest per month.

THE Bimetallic Convention, now in session at Washington, has adopted a resolution in favor of the free coinage of silver in the ratio of 16 to 1, and declaring support only to candidates who pledge themselves to vote for free coinage.

THE conductors and motormen of the Atlantic Railway Company, in Brooklyn, failed to array themselves in new summer uniforms last Sunday, and the entire system, embracing eleven lines, is tied up and 1000 men are out of employment.

THE Populists nominated J. V. Webster of San Luis Obispo for Governor at Sacramento last Wednesday. The Prohibitionists have nominated Henry French of San Jose for that responsible office. The entries have not all yet been made, however.

THE general report is that on the occasion of the recent stage "hold up" near Angeles there was only bullion to the amount of \$15,000 aboard. It transpires, however, that there were five bars of bullion, worth \$30,000 each, and some chlorine gold, making a value of \$178,000, being two weeks' cleanup of the Utica mine.

JOSEPH PIAACE, an American citizen of Meriden, Conn., has been in this country since he was ten years old, served through the Civil War, and is now on the pension rolls; but as he was born in Canton, China, he has been ordered by the Internal Revenue Collector of Meriden to register as a Chinaman under the Geary act. Joseph objects.

FOR the first time in the history of the Grand Trunk railway of Canada, all of its shops and machinery are idle and the 1200 mechanics employed by the company are walking the streets with nothing to do, and there is not likely to be a change for the better until a settlement of the coal-miners' strike in the United States has been reached.

COXEY, Browne and Jones have been sentenced to twenty days in the Washington, D. C., jail for displaying a banner in the Capitol grounds. Coxey and Browne have also been fined \$5 each for walking on the grass in the Capitol grounds. Coxey has issued a bulletin asking for money. The "Industrials" at various points are still tussling with railroad companies for free rides.

Personal.

W. F. ENOLEBRIGHT, of Nevada City, is attending the Champion-Wyoming trial.

MASTIN W. MURRAY, a well-known mining man, has lost his reason. He was formerly with Capt. Carroll, and made considerable money in mining and speculation.

JUNOE GOONWIN, of Salt Lake, Utah, is in the city. Talking of matters and things in an interview he says: "At present we are deeply interested in the Mercur gold district. Those who claim to know say that it contains more gold than all the gold fields of South Africa. The district is only two and one-half hours' ride from Salt Lake, and many people have flocked into the valley. The gold is in a queer formation, extending over miles of country. It is probably a sedimentary deposit at the bottom of what was probably an old lake. Many people are very enthusiastic at the prospect of seeing the district turn out big fortunes in gold. The gold runs from \$8 to \$20 a ton. It is certainly a rich deposit."

Milling Free-Gold Ores.

TO THE EDITOR:—The various articles which appear from time to time in your paper on quartz mills and milling are very interesting and instructive, and I think where fair comparisons are made the results are generally in favor of California milling or rather in favor of the system of medium weight stems, a short drop and a quick one, as against the long and slow drop with a light or heavy-weight stem. But there are many other conditions to look after in order to do good work in free-milling gold ores, such as the grade of the plates, height of the discharge (i. e., the elevation of the bottom of the screen above the top of the die), size of the screen, whether or not inside plates and splash boards are used, time of putting in quicksilver and amount used, condition in which plates are kept, etc. All of these conditions affect the loss or saving of quicksilver, which is the agent used to save the gold, and if silver is lost most assuredly gold is carried away with it, and how easily a pound of silver can carry away an ounce of gold. Too little attention is paid to the loss of silver and the reasons why. If the loss of silver is nominal in thorough amalgamation, then the tailings will carry but little if any value whatever in the form of free gold or particles of amalgam.

Mr. Paul states, in his article in your issue of April 28th, that he does not think there is a mill using stamps, silver plates and concentrators only that does not run away in the slimes and tailings from 20 to 35 per cent of the assay value. If he had said from 15 to 40 per cent he would be nearer right, because there are some mills which do not save over 60 per cent, and the mills that work 85 per cent are few in number, though it is very possible to work as high as 90 per cent, but it requires conditions not carried out in the majority of the mills. Mr. Paul speaks of the results from tailings at the mills of Johannesburg, South Africa, and gives figures for 1893 and 1894. His figures, however, do not convey any information as to the value per ton of tailings. I will follow with some figures deduced from the report of the Robinson gold mine of Johannesburg for the month of February, 1894. Ore crushed during a run of 27 days and 12 hours with 60 stamps was 7912 tons, the gross receipts for the month were \$246,128, or \$31.10 per ton, divided as follows:

Free gold, \$20.50 per ton.....	\$161,328
Gold from chlorination of sulphurets.....	61,812
Gold from mill tailings, 5225 tons, worked by the cyanide process, \$4.86 per ton.....	24,424

Now, calculating that from one loss or another, such as leaky vats, insufficient strength of the cyanide solutions, carelessness of employes and unfavorable conditions of the ore, for all ores are not subject to the cyanide treatment, they worked their tailings to 85 per cent of their value; then their loss, after all of the above treatments, was 86 cents per ton. Without the cyanide working of the tailings their loss would have been \$5.72 per ton, and that in an improved American mill with the best of California mining and milling men connected with the property, Herman Jennings, H. C. Perkins and Thomas Mein being among the number, which shows how much we are constantly running away with our tailings.

Mr. Paul is right in his estimation of the cyanide process, and it will only be a short time until all mills, where the conditions are favorable, will work their tailings with cyanide, but it is not applicable to ores carrying lead, zinc, copper, antimony, and coarse gold. The presence of lime is a help. Therefore it results that stamp mills must be depended on for relieving the majority of ores from the gold they carry. By making the saving of gold the first consideration and the amount crushed second, the best results will be attained. And the only way to make a success is to keep pace with the times, and if your neighbor adopts a new idea don't condemn it because you did not think of it, but try it and, if good, adopt it. Too many are apt to think there have not been any improvements made in gold-saving devices and improved methods of amalgamation, and they go right along running gold away with their tailings. Of course, everybody has his own ideas about weights of stems, shoes, dies, etc., length of drops and the number per minute; and if different millmen would contribute articles on their experience, we would know what our neighbors are doing and soon find the happy medium.

In support of my figures showing 85 per cent as the result of cyanide on the tailings, I will quote the Mercur mine of Utah, where they work the ore entirely by cyanide, the ore presenting the most favorable conditions for working, and with two or three years' experience and the best skilled labor to be had, they work it to 90 per cent of the assay value.

C. S. RICHARDSON.

Grass Valley, Cal., May 16, 1894.

In the suit in Amador county, this State, between the Keystone and Spring Hill mines, Judge Davis has made a ruling admitting the South Spring Hill to enter the Keystone mine, inspect and survey it, etc.

History Repeating Itself.

TO THE EDITOR:—There is much in the history of the Roman Empire during its long struggle for independence and liberty that resembles the existing state of affairs in our country. For instance: In Rome, 509, B. C., monarchy under the Etruscans ruled supreme. But this state of affairs came suddenly to an end and the monarchical yoke was thrown off by the formation of a republic and a constitutional form of government adopted. In this new republic the people elected as their rulers two consular departments to frame and administer their laws, consisting of the upper and lower houses, in the aggregate comprising 300 members, of which the senatorial department contained 164 electors who were elected for life. These members were chosen from the richest and most aristocratic portion of the people. The assembly or lower house was composed of the medium and lower classes—artisans, tradesmen, farmers and laborers, comprising 125 members; 164 aristocrats of the Senate chamber were from their wealth and influence—all powerful. They had each of them quite an army of retainers and henchmen. They not only claimed, but succeeded in securing nearly all the offices of power, trust and emolument. The votes of the citizens when not cast for the nominees of the aristocratic party were invariably counted out, or at the polls the voter was bulldozed into voting for the nominee selected by their aristocratic rulers.

Political clubs were organized and in operation as at date in this country, the bosses receiving their instructions from their lords and masters as to the manipulation of the ballot box. The petitions of the citizens' masses sent to the senatorial halls for relief were not read, but treated with scorn and contempt, and were either pigeon-holed or thrown into the waste basket.

This state of affairs naturally caused strife and trouble. The lower classes were maltreated, beaten and maimed by the armed retainers of their aristocratic rulers. These retainers, as in our country, represented the police force. The masses were taxed to that extent that they found it extremely difficult to provide food, clothing and shelter for their families. The laws were so stringent that in default of dues the debtor was thrown into prison and his lands escheated to the State or were confiscated by the creditor. The prisons were overcrowded with the so-called pauper laborer, who had no other recourse to earn a livelihood but to enlist as a common soldier in the army, which was officered and controlled by the aristocratic Senators. These plebeian soldiers, while in the wars of conquest which were common at that time, had their families at home, who were poverty-stricken. The soldier on his return from the wars found that his land and home had been confiscated and sold for taxes and dues. This state of affairs continued until 494, B. C. When the poorer classes found themselves reduced to so pitiable a condition, they decided to separate and form a new colony, and at an agreed and given signal they assembled en masse without arms and marched out of the city, establishing their colony and building a new city on the site of the sacred mount, thereby leaving their patrician countrymen masters of the situation in Rome proper to administer to their wants and necessities as best they could. The aristocratic Senators and their henchmen saw that they had gone too far, and they compromised with the people by the appointment of tribunals selected from the masses. The persons composing the tribune were inviolate and held sacred, and their houses were declared houses of refuge both by day and by night. The members of the tribune were granted the right of veto of any and all laws passed by the Senate that were considered injurious to the well-being of the masses. They were, however, not admitted to the senate chambers, but were compelled to remain in the street in front of the senatorial halls, which held their sessions with open doors, the crier proclaiming on the steps such laws as the Senators passed; and if they were found objectionable to the interests of the common-weal, the tribunes shouted in loud voices the single word "veto," which was reported by the crier to the Senators in the senatorial chamber and acted upon. The persons of these magistrates or tribunes of the people were considered as inviolate as the ambassadors of a foreign power.

In fact, the conditions that existed in Rome at that time were not unlike the conditions now existing in our own republic. For instance, if we the people send a petition signed by the majority of our citizens to our representatives in Washington, asking for reform in the administration of our laws, and stating our grievances, the said petition is either pigeon-holed or thrown into the waste basket unread; and if we send a peaceable and unarmed delegation of our people to our capital asking for relief or a modification of our laws, they are not permitted a hearing either in the senatorial halls or on the steps of our capitol, but our delegation is arrested and imprisoned for some fancied and ridiculous violation of the law of trespass relating to accidentally stepping on the sacred grass plat of our capital in

Washington, which is or should be the common property of our whole nation regardless of a few spears of grass that may be trodden upon by some member of our delegation. They are not even permitted to shout the word "veto" as the Romans of old did in the streets and on the steps of their capitol.

JAMES H. CROSSMAN.

545 Baldwin Hotel.

The Cyanide Process in South Australia.

After sundry experimental operations what may be termed the first cleaning-up from the cyanide plant, erected in connection with the Virginia Gold Mining Company's battery, at Wadnamanga, was completed last week, and has been attended with most gratifying results. Mr. J. W. Thistleton returned from the mine last Saturday, bringing with him the yield. From about 400 tons of ore crushed and tailings treated by the cyanide process, the yield of bullion obtained therefrom is represented by four ingots of gold, weighing respectively 37 ozs. 3 dwt., 46 ozs. 12 dwt., and two of 146 ozs. 4 dwt. each, making a total of 376 ozs. 6 dwt., valued at about £1200 for, say, six weeks' work. The smaller ingots represent the quantity (83 ozs. 15 dwt.) saved from the first treatment by the battery, while the two large ingots, weighing 292 ozs. 8 dwt., represent that obtained in the secondary treatment by the filtration of cyanide through the tailings in vats. To the above must be added another 30 ozs., which is the value, proved by assay of the battery's "slimes," that have yet to be treated. As an object lesson of the utility of the cyanide process, the yield under notice speaks for itself. With the ordinary treatment by the battery, as indicated by the gold saved, it would not pay for the working expenses; but with the treatment by the two processes the Virginia mine is enabled to more than pay its way, and employ over 50 miners.—S. A. Register.

Aluminum Alloy.

At the last monthly meeting of engineers in New York some specimens of a new alloy of aluminum and nickel were exhibited which were remarkable. They were sent in by A. E. Hunt of Pittsburg, and both were in the form of rolled sheets a fourth of an inch thick. In one of these a hole about five-eighths of an inch in diameter had been drilled out to about two inches in diameter cold, and the other, which was a strip about three inches wide, 54 inches long, had been bent at the middle, the deflection amounting to about two inches.

It was stated that the force required to do this bending had been about the same as is required to similarly bend a similar piece of 90,000-pound steel, and when the specimen was placed upon the floor and stood upon until straightened it immediately resumed its former shape upon being released; in other words, it seemed to be perfectly elastic within the limits named. The alloy is of a beautiful white color and of remarkably light weight. No information was given as to the proportions of aluminum and nickel in the alloy, but it probably contains only a small percentage of the latter, and so far as could be judged it bids fair to be an important alloy in cases where lightness and strength are especially desired.—American Machinist.

Slickens Land.

Andrew Rapp gave us this week an illustration of the value of slickens. It may be of interest to those whose land has been injured by mining debris, for it shows that in time even the clearest sand changes to loam and becomes fertile. "Garret Keppel," said Mr. Rapp, "owned a large body of land along the line of the Spring Valley Company's canal. On this land was a deep lake, so deep that it was claimed by some to be fathomless. Mr. Keppel turned the water from the canal into this lake and in time filled it up. He afterward planted the land to grain and found that the soil produced marvelously and that it could be plowed at any season of the year.

"Rufus Moore rented a tract of land, and at one time when a change was made in the line of the canal 70 acres covered with slickens three feet deep was left between where the new line was constructed and the old canal had run. He thought nothing would grow on the spot, but at length concluded to test it. He plowed and sowed it and raised upon the slickens 45 bushels of wheat per acre or more to the same area than on any of his other land."—Oroville Register.

Book Notices.

"THE USES OF COMPRESSED AIR" is a handsome brochure of 134 pages, by A. C. Rand of New York. The practical utility of air as a motive power is abundantly demonstrated, and the author, who is a recognized authority on the subject, has made a valuable addition to current literature on this topic. He shows that in all the arts of peace and war where propulsion is required the value of compressed air justifies its consideration. The book is elegantly produced and has nearly 100 original illustrations. It is published by The New York Printing Company. The price is \$1.

Interesting Alaska Letter.

The following interesting letter has been received by the *Deadwood Pioneer* from James Pasco, who is engaged in mining at Forty Mile, Alaska:

"This camp of Forty Mile was discovered last summer, and is the richest yet struck in Alaska, paying \$300 a day to the man. The nature of the Yukon country is such that it is a tolerably hard place to get to. The honorable class of old-time miners have possession, and tough characters, when found, are at once ordered to leave, several having come out recently.

"I will give you prices of a few articles in Forty Mile: Flour, \$14 per 100 pounds; bacon 33 cents per pound; beans, 22 cents, and canned fruits 60 cents. A Mackinaw shirt costs \$8 and a pair of gum boots one ounce of gold-dust. Now comes the root of all evil—whisky. This sells for 50 cents a drink and \$8 a bottle. You can buy everything a miner needs for less than you can take it in for, as the natives will charge 13 cents a pound to carry it over the mountains, a distance of thirty miles, and no one should take anything with him except clothing.

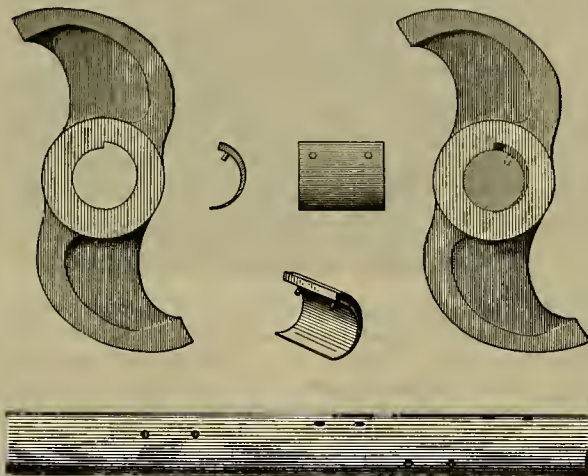
"The town of Forty Mile is at the mouth of Forty Mile

a territorial division has been made, which is said to consist of a line drawn north and south through Europe in a somewhat irregular manner. The Standard, it is said, is to control the trade of the British Islands, France and most of the western portions of Europe, including a part of the German Empire. The Russian companies have gained rapidly for several years in China, India and Japan and are now doing considerable more than one-half of the business of these countries.

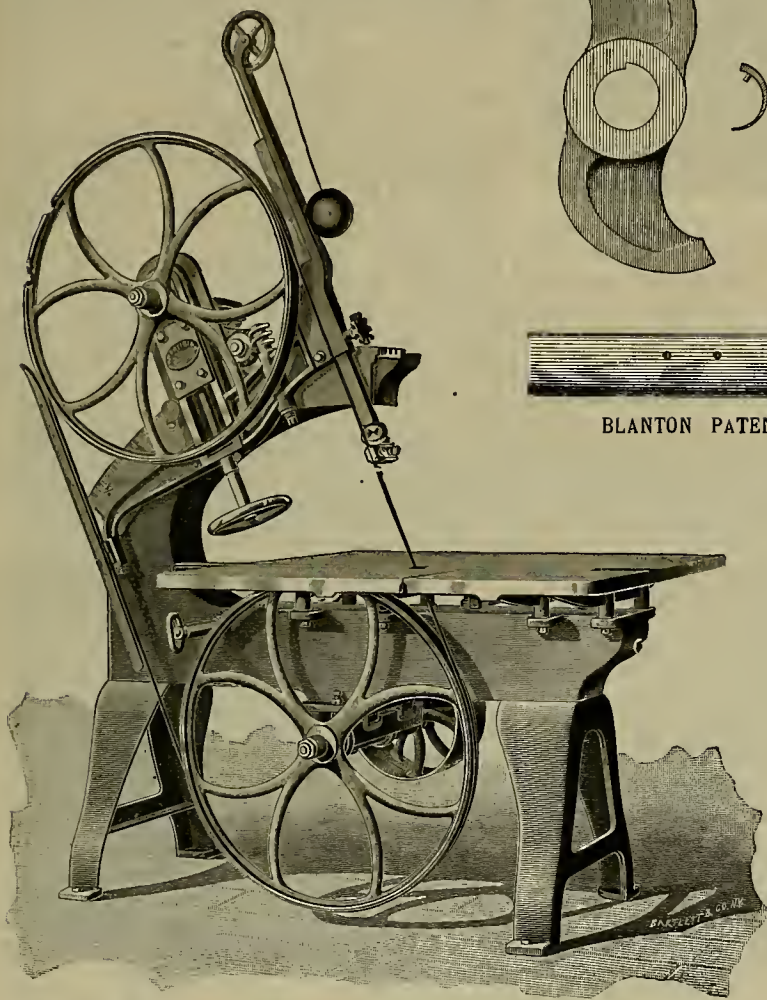
Self-Tightening Cam.

Herewith is illustrated the Blanton patent self-tightening cam, manufactured by Fraser & Chalmers of Chicago, E. A. Rix, 104 First St., this city, being the local agent. It is considered an improvement in the construction of stamp mills, being simple in character but effective in purpose.

The cam and its application are shown in the cut. Taper bushings, which may be forged upon the cam shaft, but which are preferably separate pieces secured by pins, afford



BLANTON PATENT SELF-TIGHTENING CAM.



ADJUSTABLE BEVEL BAND-SAW MACHINE.

crusher doing duty at every point in revolution of the pulleys and gears, thus obviating any jar. It is manufactured under the Rutler, Scoville and Fraser patents. E. A. Rix, 104 First St., San Francisco, is the Pacific coast agent.

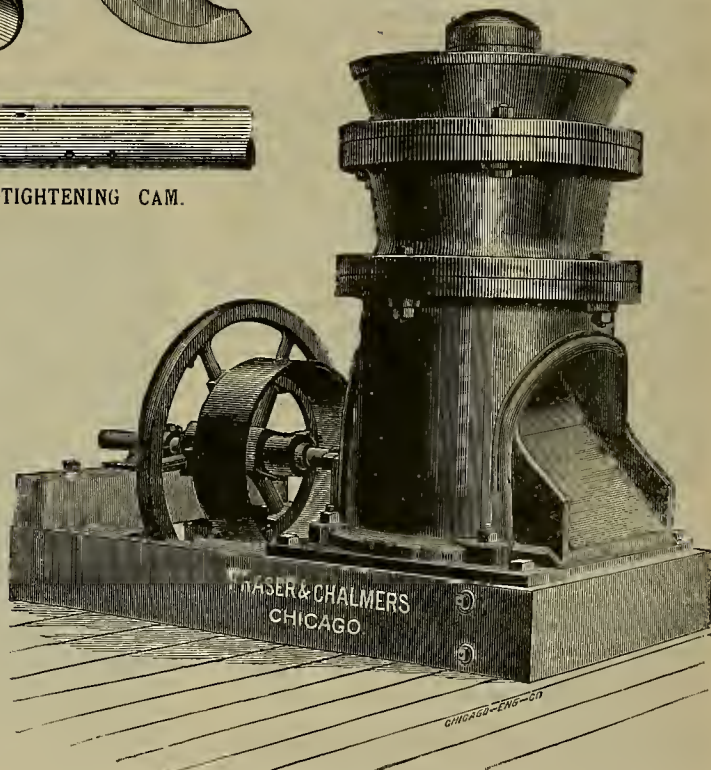
Adjustable Bevel Band-Saw Machine.

On this page is illustrated an adjustable bevel band saw machine. It is a right-hand machine, designed to avoid the difficulties encountered in holding and guiding work on inclined tables, and can be inclined from 0 to 45 degrees by turning a hand-wheel. When a varying bevel is desired, as for ship work, it can be produced by turning the hand-wheel while the work is being fed to the saw. It is made by P. Prybil, 512 West Forty-first street, New York.

The diameter of wheels is 40 inches. Height of sawing space, 16 inches. Total height, 8 feet 6 inches; width, when set at 45 degrees, 8 feet 9 inches; depth, 4 feet. Loose and tight pulleys, 16 inches diameter for a 6 inch belt. The wheels are covered with rubber, vulcanized upon them. In every case the upper wheel can be angled while in motion, and from the front of the machine. The tension of the saw is maintained by a rubber spring, which is superior to a weight in its ability to yield instantly when a chip gets between saw and wheel, and in not needing separate adjustment when any change of saw is made, as one and the same movement adjusts the upper wheel to length of saw, and produces any degree of tension required.

The Longest Railroad.

The entire length of the Siberian railroad from



THE COMET ROCK BREAKER.

creek on the Yukon. It has two general merchandise stores. One belongs to the Northwest Trading Company and the other to our old-time Montana friend, Capt. John Healy. There are two saloons and one cigar factory here and 150 miners' cabins with about 350 miners. These make up the town of Forty Mile.

"All the northern part of Alaska is more or less level country, and it is difficult to get sufficient grade for sluice-boxes, and in many places they are compelled to use rockers or wheel the dirt to water. Timber is very scarce and in many places they are compelled to haul 40 or 50 miles with dog trains. A dog will draw about 500 pounds on the snow. Game is scarce, except rabbits and grouse. The ground never thaws out in that country, not over five or six feet at most, and they never have been able to dig through it. They work down so far as the frost is out the first year, and then wait for the "never-setting sun" of the next summer to thaw it deeper. The miner can run his sluice boxes but three and a half or four months in the year. The rest of the time he can whipsaw timber for boxes and such sawed stuff as he may require. Some spend the winter trapping furs, but they must be on hand by June 15th or their claims will be jumpable according to the Yukon code of laws."

AS A RESULT of negotiations held in Paris between Standard Oil representatives and those of Russian interests,

seats for the cams, which are bored to fit and work tight upon these bushings. The method advised for securing the bushings is by means of pins as shown, since there is no shearing stress upon the fastening. When necessary to take off a cam, a slight blow on the back edge with a hammer loosens it instantly. For the adjustment of ordinary cams to their proper positions on the shaft they are sent blank, the key seats having to be cut at the mill. The entire cam hub, by its self-tightening construction, takes hold upon the shaft and dependence is not placed on the shearing stress of a key, which is liable to be driven so as to split the cam or impair its strength for severe service.

The Comet Rock Crusher.

The accompanying illustration is of the Comet rock crusher, manufactured by Fraser & Chalmers of Chicago. It is of large receiving capacity and easy motion, and is said to be capable of handling a ton of rock a minute. The axis of the upright spindle is not coincident with main axis of the machine or bevel wheel, but intersects it in the journal at the top, while the lower end is from one-fourth inch to three-fourths inch out of the center, according to the size of the crusher, thus causing a gyratory motion at the bottom of the spindle, the top of the journal being virtually stationary, except the slight motion due to the angularity and which is compensated by the oscillating box, the

Cheliabinsk to Vladivostok is 7112 versts, (4703 miles.) The main line of the Canadian Pacific from Montreal to Vancouver is 2904 miles in length. The estimated cost of the Siberian road is 350,210,482 rubles, or \$269,662,071. This would make the average cost per mile in the neighborhood of \$25,000, which is about the average cost of railroad construction in this country. In the two years during which the Government has been at work good progress has been made. Part of this route presents engineering problems most difficult of solution, for there are mountains to be tunneled or climbed, rivers to be bridged, lakes to be skirted and marshes to be crossed. It is hoped that the entire road will be in operation by 1900.—N. Y. Times.

IN VIEW of the increasing scope of usefulness for compressed air in machine and construction shops, the Clayton Air Compressor Works, Havemeyer building, New York, have issued a special pamphlet of steam and belt actuated air compressors, air governors and air receivers of designs especially adapted to supplying air for this duty. This pamphlet will be sent to those interested upon application.

SMOKELESS POWDER has been followed by a chemical combination called a "fog creator." A German named Reihm is the inventor. It is a shell, which, when it explodes, surrounds in darkness the troops at whom it is aimed. It also causes the soldiers to cough.

Method of the Capillary Electrolytic Sluice in the Extraction of Gold.

PAPER NUMBER TWO.

Written for the MINING AND SCIENTIFIC PRESS by J. H. Jory.

In my former paper on this subject a general outline was given of the character of the process and the conditions on which it is based. On entering into the more specific details of the system, which seems to be warranted by the general expressions of interest evinced, I will reiterate the statement before made; viz., that gold, however placed in nature in the superficial strata of the earth, exists as a metal. Not because this is doubted by scientific men, but because it is generally overlooked by miners in the perplexing difficulties of reducing refractory ores, and that on this fact is based the further proposition that gold may be freed from its enclosing matrix, of whatever chemical character, by mechanical means. For this reason of its natural condition, the rock containing gold is not usually spoken of as "ore" by metallurgists, although the term is sometimes used as a matter of convenience and in its relation to the other mineral compounds contained therein.

The problem of the extraction of gold, therefore, is in reality a simple one, notwithstanding the conditions involved in the simple process of saving the metal reduced to its ultimate subdivision and floating in sluices have appeared so insuperable that metallurgists have preferred to take the bull by the horns in attempting to recover the precious metal by reducing not only the gold, but the various chemical compounds contained in the matrix, which is a very complex problem indeed.

The capillary electrolytic sluice assumes the possibility of the solution of the simpler problem, and accomplishes that result in the manner briefly described in the former paper.

The apparatus is formed of about 50 amalgamated copper plates arranged almost vertically in a box-like sluice, each plate being hung on four pivots in such a manner that simultaneous movement may be communicated to the series by an adjusting screw placed at one end of the sluice-box, opening or closing the spaces between the plates in a manner similar to the movement of the slats of a Venetian blind. These plates are 12x14 inches in dimensions, and one-quarter inch thick; the spaces between, which are termed capillary passages, are, when the plates assume a vertical position, about two inches in width, but when adjusted to receive the fluid in which the gold is held in suspension, the plates recline at about an angle of 45 degrees, and the capillary passages approximate to about one-fiftieth of an inch, a floodgate at each end of the sluice preventing the passage of fluids except through these passages.

The electric current produced by a one to three-horse power dynamo is conducted by wires attached one to each of the end plates of the series; the series being brought into circuit through the medium of the fluid between the plates. In practice, the pulp from the battery, properly diluted, flows into the sluice-box until it attains a depth of about one foot, when, if the plates are properly adjusted, the weight of the superimposed fluid will be sufficient to cause a discharge through the capillary passages equal to the influx; the greater depth of the fluid causing a greater discharge, and vice versa, thus securing an equilibrium in this regard, within certain limits, automatically. The occasional readjustment necessary, consequent on the coating of the plates by the precious metals, is made by a simple turn of the adjusting screw. The water supplied to the battery should be about one-third more than is usual; this is especially necessary when the rock is magnesian or aluminous in character, to secure a proper discharge. To obtain the necessary pulverization, the screens on the battery should be fine, those made of brass wire with a mesh of 100 to the linear inch being most suitable for this process.

There are two advantages secured by the arrangement of the plates described above, aside from its electrolytic possibilities. In the first place, the stream is divided into numerous narrow channels through which it is impossible to pass without bringing the metal held in suspension into intimate contact with the amalgamated plates. Second, the peculiar molecular force induced by the proximity of the plates greatly increases their attraction for those metals with which they are in affinity, by what is called capillary action, thus rendering it still more improbable that any metal such as gold, silver or mercury should pass the proximate amalgamated surfaces without adhering thereto. But by considering how infinitely both these probabilities of contact and adhesion are increased by the electric current employed, by its electrolysis in decomposing the films of oxides or sulphides, clouding the amalgam or the particles of gold, and its electro-motive power in carrying and adhering those particles, it will be seen how improbable, theoretically, is the escape of any of the precious metals

contained in the flow; and in this case the fact is very conformable to the theory.

The effect of a continuous current of electricity when employed in this apparatus is to attach such positive elements as the metals named above to the negative surface of the plates in circuit, and to attach some of the negative elements contained in the matrix to the positive surface, though in a much less permanent manner, yet tending to clog the capillary passages. For this and other reasons an alternating current is employed which has the effect of adhering the gold to both surfaces and causing a perfect discharge of the elements not desired.

The sluice described above is adapted to the service of a five-stamp battery, and being of a convenient size it is better to employ a number of sluices in large mills, or in hydraulic mines, rather than to increase its size, although this may be done if found more convenient. Sluices of a much smaller capacity may also be made, electrically supplied by chemical batteries, which may be used in the laboratory or in the assaying department of mills as detectors of waste in the outflow and for other purposes; an exact determination of the weight of the plates before and after a few hours run giving a very simple and practical test.

There are other forms of the capillary electrolytic sluice of more complex designs than this that has been described, which is adapted to metallurgical processes of a more complicated character; but as these do not come within the scope of the present paper their description must be left to some future period.

Gold Placers Formed by the Wind.

In the early days of gold mining in California, deposits of sand and gravel rich in the precious yellow metal were occasionally stumbled upon in strange and unexpected places. They were generally formed by the action of water at some period in the past ages, though there were those that were the result of slides. However, as the paying gravel in the slides came from deposits formed by ancient rivers and water courses, it may be said that water was the active agent in the formation of all the old California placers, both great and small. Now that mining is being pushed far out in the almost waterless desert regions, we are finding some new puzzles. One of these, says the *Enterprise*, is seen in the rich dry diggings of Summit district, on the Mojave desert.

"In this new district are over 200 permanent settlers, and already some 60 dry-washing machines are constantly at work. The "dry washers" are winnowing machines through which the dry soil and sand—the pay dirt—is run as grain is run through a fanning mill. All these machines are paying well. Reports from the district say: "Curiously enough, the flat mesa lands pay better than the gulches, and the ground yields more gold right at the surface than it does deeper down."

This at first sight seems very singular, and it is quite contrary to anything ever seen in the old gold placers of California, those in and bordering upon the Sierra Nevada mountains. The explanation of the mystery is, however, doubtless to be found in the action of the heavy winds which sweep over the desert. The sweeping gales blow away the sand and the light, decomposed soil, leaving the gold behind. In the rainy season all the gulches become torrents, and soil and sand, containing gold, are swept down and deposited upon the flats. As soon as the rains are over the wind catches up and carries all the light material, leaving on the flats the grains of gold. Indeed, we see that nature has here set up a big winnowing or dry-washing machine of her own, and by means of it has formed a gold placer of a novel kind. In the waterless Mojave region the desert winds perform the work that was done by water when the placers of the Sierra Nevada range were formed.

The Price Suit.

The action commenced by the Bank of California against Thomas Price in the matter of the disposition of certain real estate in this city is a friendly suit intended to straighten out some financial matters between the parties involved. The firm, which still commands one of the largest businesses of the kind on the coast, got snarled up some time ago owing to its heavy investments in ditch property of considerable value in Placer and Nevada counties. Over \$200,000 is tied up temporarily in the El Dorado Water Company and other contingent interests, which when cleared up will eventually put this old, respected firm on its feet again, financially as strong as ever.—Evening Post, May 16th.

The steamer *Britannic* has recently completed her 200th round voyage and 400th passage across the Atlantic. She has traveled a distance of nearly 1,500,000 statute miles with her original engines and boilers.

Native Miners in Mexico.

In Mexico, says J. H. Palmer in the London *Mining Journal*, miners form a caste apart, and a very aristocratic caste, too—looking down upon rancheros and agriculturists generally with fine contempt. After all, they have good reasons for thinking themselves superior to the cultivators of the plains. A miner is easily worth his \$1 a day, besides being very much his own master, whereas the best agricultural laborers do not earn more than 25 cents, if so much, per diem, and through debt and ignorance they are still in a condition not far removed from slavery. The miners, on the contrary, are very independent, and a foreigner has to exercise considerable tact if he means to get on with them. The Mexicans are very proud and sensitive in many ways, and an angry word or an ill-judged rebuke is often quite enough to make a good man leave his work; on the other hand, with those who can combine kindness with authority, they are the best of workmen, steady, courteous and intelligent.

There are three classes of labor employed underground in Mexico—miners proper, *fáneros*, or unskilled laborers, whose business it is to clear out the workings after a blast, and *tenateros*, or packers, who carry the roughly sorted ore and waste to the shaft or adit tramway. The skilled miners work in gangs of eight men each, and are paid by contract. Each gang has a captain, who alone is responsible to the engineer of the mine. These contractors have to buy their dynamite, candles, etc., from the mine stores, but are provided with drills, which are weighed at intervals and the wear charged against the gang. A drift 2 meters by 2 will cost about \$20 to \$40 per meter, but the contractors are not expected to remove the broken rock. This is done by the *fáneros*, who work on day wages of 50 to 75 cents. These men also sort the ore roughly, clean out the workings and put the stone ready for the *tenateros*, who sack it up and carry it to the shaft. These *tenateros* are paid so much per sack, according to the weight and distance traversed. They can carry as much as 150 pounds at a time up the steepest winzes, and earn from 75 cents to \$1 per day. The work is very severe and exhausting, and heart disease and lung trouble are only too rife among them. Ore shoots and tramways in the levels are not used to the extent they should be, and though there is never any difficulty in getting sufficient ore broken down, want of labor often causes much vexatious delay in bringing it to the surface.

A cheaper way of working than the foregoing is to let a mine out in sections to *buscones* or tributors. Each party has so many feet along the vein or an end to drive. They pay all their expenses and are entitled to half the ore they bring out. The mine generally buys the *buscones'* half at a fixed price on the assay value, but they are sometimes allowed to take their ore away on their backs for sale elsewhere. Letting out a mine to *buscones* is advantageous in the early stages of development, for the Mexicans will make a good living out of a poor vein, where a company cannot even expect to make expenses. In this way a mine can be opened up very cheaply, but these tributors require very careful watching in order to restrain their "burrowing" propensities; as their reward depends entirely upon the ore they bring out, they are not very anxious to do any dead work, or to remove a single stone more than they can help. If they are not properly looked after the result, of course, is a network of narrow, tortuous and dangerous workings, which have to be widened and squared off afterwards at the expense of the mine. *Buscones* are also employed in those parts of a mine that are nearly worked out, and where it would not pay to set an ordinary contract. They know the ore so well, and are so acute and persevering in following up the narrowest stringers, that they can keep workings in operation long after they would otherwise have to be abandoned, and thus often pave the way for future discoveries.

When the ore reaches the surface a great deal is done to it before it is considered to be ready for the reduction process. In all the dry ores the silver-bearing minerals are so finely disseminated throughout the gangue that any system of mechanical concentration is quite out of the question. In Colorado and Montana, where labor is dear, and fuel and crushing power are cheap, all the lode matter goes straight from the mine to the mill without any preliminary sorting, but in Mexico, where cheap skilled labor is abundant and machinery expensive, it does not pay to crush large quantities of waste rock, and hence an elaborate and efficient system of hand picking and sorting is in vogue. Any large lumps of ore are broken up, and the rest is thrown upon an inclined grizzly, with $\frac{1}{4}$ -inch mesh to remove the fine stuff or *tierras*. All that will not pass the grizzly is then washed upon a sloping stone table or *lavadero*, provided with a tank at the lower edge. This tank is cleaned out from time to time, and the mud collected will often average 40 ounces of silver per ton. The washed ore is then handed over to the sorters or *pepena-*

dores, who chip off the worthless portions, and classify the mineral into grades either for shipment or local treatment. All ore containing over 200 ounces of silver per ton is generally sold to the agents of American smelting companies, anything of lower assay value going to the patios. In Guanajuato and Zacatecas the average product of the mines at present is from 20 to 30 ounces of silver, with a varying amount of gold per ton, and it is found that the patio process works best upon ores of this richness. The waste rejected by the sorters should not contain more than six or seven ounces of silver, and this is again picked over upon the dump, so that very little is finally lost. The cost of all this sorting is about \$1.50 per ton, but considering that the low assay value of the ore is generally doubled, and that the waste goes to the dump instead of being crushed, it seems that there is ample justification for this expenditure. In many mines without reduction works the sorted ore is sold by assay as it lies at the mine, and is packed off on mule-back to the towns for reduction. In the older districts there are plenty of reduction establishments which are glad enough to buy ore at very fair prices, so that a new enterprise is not under the necessity of buying expensive crushing and amalgamating machinery until the mine is properly proved.

Electric Mine Locomotive.

Concrete examples of the adoption of electricity to the exclusion of all older methods are generally more convincing in their import to the public mind than mere hearsay or description. The illustration shows a striking example of the supersession of older haulage methods by the electric mine locomotive in an important coal mine in Pennsylvania, and emphasizes the vast advantage which its use confers.

The mine in question is the Bear Run mine of the Blossburg Coal Co., near Landrus, Tioga county. The locomotives, of which there are two, are of the T. M. M.—that is, "two-motor-mining" type, each of 30-horse power, manu-

run into places impossible to any mule, and their ease of control and operation is such as to render them invaluable.

A Boon to Merchants and Shippers.

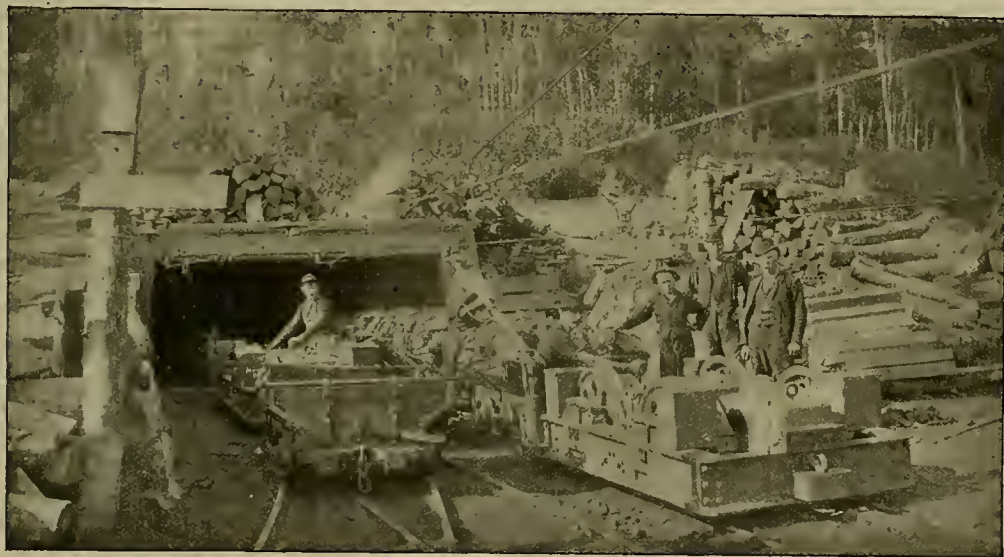
The cut presented herewith tells its own story. This fountain marking brush is clean, handy and always ready for use. It will pay for itself many times over as a convenience and time-saver. It is the invention of R. G.



BAILEY'S FOUNTAIN MARKING BRUSH.

Bailey of San Francisco, and will doubtless come into general use on its merits.

The tube is charged by unscrewing the cap from the top and filling with any ordinary clean marking ink, such as lamp black and turpentine. One filling will do a great amount of marking. To use, open the valve by



ELECTRIC MINE LOCOMOTIVE.

factured by the General Electric Co. They are propelled by two W. P. 30 motors, one being geared to each axle. Current is brought to the motors by a specially designed trolley arm, on which the trolley wheel is swivelled, to permit of its adjustment to the various irregularities of the wire line. The trolley arm can be set in sockets on either side of the locomotive, which may thus be run into headings on either side of the main haulage way which is lighted by incandescent lamps placed at the entrance to each cross-head, 100 yards apart. The dimensions of the machines are: Horse-power, 30; speed, 6 miles per hour; draw-bar pull, 1500 pounds; gauge, 36 inches; wheel base, 30 inches; diameter of wheels, 28 inches; width over all, 48 inches; length over all, 9 feet 6 inches; height above rail, 31 inches; weight, 7500 pounds.

The current is furnished by a General Electric D 62, 75-horse power generator, driven by a Harrisburg Ideal 30-horse power engine.

The maximum load which these locomotives have been called upon to handle is 32 loaded mine wagons, each weighing 3200 pounds, and the way is one part a 3 per cent grade. The daily haul of the locomotives is about 650 tons.

The entire plant has been pronounced eminently satisfactory, the locomotive having shown capabilities beyond the specification or the General Company's guarantee. Their presence in the mine has done away with the slow-going, limited mule, and induced great economy. The small height of the machines above the rail level allows them to

unscrewing the tube at the bottom about one-fourth of a turn, or till the ink flows over the brush. Two or three trials will enable any one to control the feed perfectly. When not in use, the valve is to be closed.

The brush can be replaced when worn by any common brush of same size as easily as placing a new pen in a pen-holder.

Deep-Sea Soundings.

A ship regularly engaged in deep-sea sounding has the sounding machine mounted in the after-end, and when about to sound is brought to a standstill, with the stern to the sea. The stray line, with the sounding rod attached, is over the guide pulley and carefully lowered to the water's edge, the register is set at zero and the deep-sea thermometer is then clamped to the sounding line; a seaman is stationed at the friction line, which controls the velocity with which the wire is unreeled, another at the brake and a third on the grating outside to handle the sinker and instruments and to guide the wire as it passes overboard; a machinist is at the hoisting engine and the recorder takes a position for reading the register. When the sinker is let go the vessel is maneuvered so as to keep the wire vertical, and the friction line is adjusted so as to allow it to descend from 70 to 100 fathoms per minute.

The instant the sinker strikes the bottom, which is unmistakably indicated by the release of the wire from strain, the reel is stopped by the friction line and brake; the recorder notes the number of turns of the reel. In an hour

this messenger of man's ingenuity makes its excursion through five miles of watery waste to the abysmal region of perfect repose and brings to the light of day the soil with which the rain of shells of minute infusorial organism from the upper waters has been for ages mantling the ocean's floor. Here and there a giant peak rising from these sunless depths lifts its head to see the sky and the dredge and trawl tell us that along his rugged sides, and on the hills and plains below, and even in the inky blackness and freezing cold of the deeper valleys there is life.—Popular Science Monthly.

Minerals of the Pacific Northwest.

TO THE EDITOR:—Herewith find a list of minerals of economic value, and their locations, found in the Pacific Northwest, of probably sufficient value to warrant publishing. It will certainly be of great interest to your large circle of readers in Oregon, Washington and Idaho, and, probably, elsewhere. READER.

ANGLESITE (Sulphate of Lead)—Surface ore of many argentiferous lead mines; Wood river, Coeur d'Alene, Colville in fine crystals. ARGENTITE (Silver Sulphide)—Silver City; Taboma mine, Atlanta; and elsewhere.

ARSENOPYRITE (Arsenical Iron)—Applegate, Oregon; Rocky Bar, Granite, Yuba, Idaho; and elsewhere.

AZURITE (Blue Carbonate of Copper)—Lemhi, Custer and Alturas counties, Idaho.

BARITE (Heavy Spar)—Yank vein, Josephine county, Oregon; Mulan, Shoshone county, Idaho.

CALCITE (Limestone)—Polk county, Clackamas county, Rogue river crossing, Jackson county, Williams creek, Josephine county, Oregon; Shoshone county, Alturas county, Idaho.

CEMENT (Natural Cement)—Oakland, Douglas county, Oregon. CERARGYRITE (Chloride of Silver)—Owyhee mines, and other parts of Idaho.

CERUSSITE (Carbonate of Lead)—Wood river, Coeur d'Alene, Colville, and elsewhere.

CERVANTITE (Antimony Ochre)—Wood river mines, Mountain City, Bitter Root mountains, Idaho.

CHALCOPYRITE (Copper Pyrites)—Cow creek, Douglas county, Oregon; and in many gold mines.

CINNABAR—Evans creek, Jackson county, Oregon.

CUBANITE (Copper Ore)—Near Kerbyville, Josephine county, Oregon.

CUPRITE (Oxide of Copper)—Rogue river, Oregon.

DUFRENOYSITE (Sulpharsenide of Lead)—Crown Point mine, Banner district, Idaho.

FEIBERGITE (Silver-Bearing Gray Copper)—Sawtooth district; Coeur d'Alene mines, Idaho.

GALENITE (Galena)—Santiam mines; Near Table Rock, Clackamas county, Oregon; Wood river, Lemhi, Coeur d'Alene, Idaho; Colville mines, Pend d'Oreille district, Washington.

GARNIERITE—See Nickel Ore.

GOLD (Native)—Pebastin and Swauk districts, Washington. Numerous placers and veins in southern and eastern Oregon. Placers of Boise basin, Snake river and other old alluvial washings. Quartz gold at Yankee fork, Mt. Estes, Rocky Bar, Atlanta, Red Warrior, Canyon Creek, Linn City, Murray, and other districts. Fine specimens of crystallized gold from Gold Hill mine, Boise, Idaho, and White Bull mine, Santiam district, Oregon.

GRANITE—Principal country rock of central Idaho; excellent building stone, but not used. Some apparently double granites are found in the upper Yakima region. Abundant in Pine creek, Union, Baker and Jackson counties, Oregon.

GRAPHITE (Black Lead, Plumbago)—Siskiyou mountains, Jackson county, Oregon.

GYPSUM (Plaster of Paris)—Union county, Oregon.

HALITE (Rock Salt)—Southern Idaho.

HEMATITE (Iron Ore)—Wood river (Chase's mine), used as flux. Near Caldwell (Nargansett mine); Lake Pend d'Oreille, used as flux; Cle-el-lum district, Washington.

IRIDOSMINE—In gold placers, southern Oregon.

JET—Clatsop county, Oregon.

LIGNITE (Coal; Brown Coal)—King and Pierce counties; Whatcom, Skagit and Lewis counties, and numerous other localities near Puget sound, Cowlitz river, Washington; Coos bay, Tillamook, Clatsop and Columbia counties, Oregon; Lookingglass prairie, Douglas county, Oregon; Goldendale, Washington; Crooked river, Oregon; Salmon river, Idaho; Owyhee, Ada and Boise counties, Idaho.

LIMONITE (Brown Hematite; Bog Iron Ore)—Oswego, Clackamas county; Multnomah, Marion and Columbia counties in large deposits—in Oregon. Jefferson county and other localities in Washington.

MAGNETITE (Magnetic Oxide of Iron)—Gold Hill, Jackson county, Oregon. Ocean beaches of Oregon and Washington; McKenzie river, near Eugene; Snake river placers; many mines in Idaho and Washington.

MALACHITE (Green Carbonate of Copper)—Big Lost river, Lemhi county, Idaho.

MARCASITE (White Iron Pyrites)—In some gold mines.

MUSCOVITE (Mica; Isinglass)—Near Spokane Falls, in large sheets; a valuable source.

NICKEL ORE—Big Pine mountain, Douglas county; also, Baker county, Oregon.

OCHRE (Red and Yellow)—Oregon City.

OSMIRIDIUM—See Iridosmine.

PLASTIC CLAY—Near Tacoma, Washington.

PROUSTITE (Light Ruby Silver Ore; Arsenical Ruby)—Monarch and Buffalo mines, Atlanta, Washington. Sawtooth district, and other localities.

PYRRARGYRITE (Dark Ruby Silver; Antimonial Silver)—Atlanta district, Sawtooth district, Smiley's basin and Owyhee district, Washington. Monumental mine, Grant county, Oregon.

PYRITE (Iron Pyrites)—In most gold mines. In concretions and masses, Yamhill county, Oregon.

PYROLUSITE (Manganese Ore)—Columbia county, Oregon; Shaw's mountain, Washington.

PUMICE—Cascade range and eastern Oregon; southern Idaho.

SANDSTONE—Fine varieties, including freestone, near Boise City; Coast range, and Cole's valley, Douglas county, Oregon; a fire-resisting material, suitable for furnaces, hearths, etc.

SILVER (Native)—Atlanta district. Owyhee, Eagle City, Shoshone county, Idaho, in quartzite; and many other localities.

SPHALERITE (Zinc Blende; Black Jack)—Bonaparte mine, Atlanta, Wardner district. Santiam mines (auriferous), and generally accompanying galenite, pyrite, etc., in mineral veins. Heavy masses in Bohemia district, Oregon.

STEPHANITE (Brittle Silver)—Custer mine, Yankee fork; Queen's river district, and elsewhere.

STIBNITE (Sulphide of Antimony)—Mountain City, near Murray, Idaho, in very large deposits, said to be argentiferous. Wood river mines, Idaho. Santiam and Bohemia mines, Oregon.

TETRAHEDRITE (Silver Fahlore; Gray Copper)—Shoshone county, Idaho, and elsewhere. A very obscure and uncertain mineral. Most of the so-called gray copper is zinkenite, a sulphide of lead and antimony.

ULENITE (Borate of Lime)—Curry county, Oregon.

Scientific Progress.

New Chemical Methods.

It is noticeable, although not remarkable, that important or interesting discoveries should so often be made simultaneously in different places. It is not remarkable, because contemporaries work in the same field and with practically the same capital produced by the collected experience of their predecessors. The mechanical production of diamonds is an example of this. Henri Moissans had scarcely published the results of his beautiful experiments, when three other French chemists stated that they had been occupied with the same problems, and each with more or less success, as having produced crystals of varying degrees of hardness.

But to leave diamonds and all their connections and take a look at gold. And first of all we must put entirely aside any question as to whether gold can be artificially produced. Carbon is found in three states, the most important of which is the form of the diamond; but gold exists only as a yellow, heavy and soft metal, which we know, and which we can obtain only by separating it from its union with tellurium, silver, copper, or from stones in which it is concealed, the so-called veins.

A weak solution of cyanide of potassium in water dissolves gold; very slowly when in a solid state, but very easily as a powder. This capability of solution exists so far that a crystal of coppery sand containing gold retains its exterior form in this solution after a sufficient length of time has elapsed; when under the microscope it is observed that it seems to be interwoven with layers similar to those of the honeycomb. These show the positions in which the dissolved gold had settled in the fine cracks of the crystal. On this circumstance, which has been known for 50 years past, MacArthur and Forrest founded their experiments of extracting gold from unburnt clay. Practically, however, this experiment does not run so smoothly, and besides, it is very expensive. In the first place, a great deal more of the solution was needed than the theory demanded, viz., that two parts of this salt would suffice to obtain three parts of gold. Further, this method could not be used for rich earths, because the thick grains of gold found therein would not completely dissolve, and such earths as contain other metals beside gold, which must also be obtained by this solution, which, as in the former case, becomes too expensive. On the other hand, it is a most excellent method for obtaining that gold which is scattered in such fine particles that the single little gleams thereof, freed from the vein by pounding, remain on the surface of water for several hours, although 19 times as heavy.

Working with cyanide of potassium is never pleasant, although not so dangerous as might be feared, considering the great number of men employed in it. It causes very painful ulcers in any sort of wounds, and the workmen complain greatly of headache, faintness and dizziness. If a quantity of sulphuric acid were poured into one of the enormous casks containing the pounded earths and cyanide of potassium, so that the Prussian blue would be driven out into a closed room, scarcely one life out of a hundred could be saved, as the Prussian blue paralyzes the nervous system with the rapidity of lightning. This operation has had to struggle painfully for a place, as the gold-diggers look upon it with the greatest suspicion. But it is already considered indispensable as a means of obtaining the "floating gold" above mentioned, and for the further profits of the earths from which the principal parts of the gold have already been obtained. In the Transvaal, a sixth part of the total production is obtained by means of this method, and it is to be hoped that earths which have formerly been useless may also

be worked out by it.—Translated from the Berlin Tageblatt.

Aluminum Headlight.

A headlight is now manufactured which will be highly appreciated by medical practitioners. Since the practice of transillumination, or the lighting up of animal tissue in order to detect morbid growths, has been introduced into surgery, great improvements have been made in means whereby the surgeon can instantly project a flood of light on any desired surface by a powerful lamp, attached to a band encircling the head of the operator. The improved lamp is of aluminum, and is so light that its weight is scarcely perceptible on the head. A universal joint enables the light to be changed to any required position. The front of the lamp has a disk of glass, in the center of which is a lens which throws a strong and concentrated light on the point of operation. The edges of the disk are ground glass, so that a diffused light is shed upon the surface immediately surrounding the point most brilliantly illuminated, instead of its being in total darkness.

Smokeless Powder.

Some interesting results with a new brand of smokeless powder discovered by a Virginian have just been reached with the four-pound rapid-fire gun at the Washington naval proving station. This powder was developed by a Mr. Leonard, and experiments with it prove that it is the superior of any yet discovered, either abroad or in this country, and that it is probable that the Navy has at last found a brand that will answer all requirements, both for the new small arm and heavier ordnance.

The new powder is manufactured in solid bricks 24 inches in length by 12 inches in diameter. Eleven pounds of powder gave a velocity of 2537 feet and a pressure of 28,000 pounds, and the highest charge (12 pounds) used gave a velocity of 2736 feet and a pressure of 17.8 tons. These velocities are the highest ever obtained in this country. The results are considered by ordnance officials to be of the highest importance, inasmuch as they place the powder at the head of any yet made.

Progress in Melting Iron.

The introduction of some late inventions for melting iron indicates the march of progress in this particular very forcibly. Every effort is now put forth to prevent the immense waste of heat which occurs in ordinary cupola melting, by a disposition of the tuyeres such as will burn the ascending combustible gases without heating the fuel to incandescence, in which instance the developed heat preheats the iron and fuel before it reaches the melting zone. What may we not expect in the prevention of heat waste when we find that electricity has at last been successfully applied for melting cast iron? It is claimed for the "Taussig" electric system of melting cast iron in exhausted chambers that oxidation and creation of air bubbles are avoided, and the cost for driving the dynamo is 50 per cent less than would ordinarily be required for melting by the best practice. — Eng. Magazine.

Detecting Dynamiters.

Chemistry is offering a means to oblige would-be dynamiters to betray themselves should they try to carry about hand grenades and cartridges. It is to mix dynamite with certain salts that give out a stench, and plunge cartridges into a solution of these chemicals. This fetid smell thus caused is not to be got rid of, and is communicable. A person carrying this infernal machine, or who had carried or handled one, unless with leather gloves which had been taken off with great care, would be at once detected by the odor.

A CINCINNATI MAN has invented a traction gasoline engine, the first in the history of the world. It can be run cheaply at high speed without danger, and will, it is predicted, displace the trolley.

THE latest theory of the origin of the canals of Mars is, that they are the result of smaller bodies striking the planet at a tangent. This would account for the perfect straightness of the canals.

A BILL was passed at the last session of the New York State Legislature offering a prize of \$50,000 for the invention of an economical street-railway system of traction.

SINCE M. Pasteur began to practice his inoculations against hydrophobia 14,430 persons have been treated by his method, of whom only 72 have died of the disease.

Metallurgy and Ores.

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Mechanical Progress.

Natural Gas Production.

THE only State in which the use of natural gas for manufacturing purposes increased last year is Indiana. The total value of natural gas consumed in the country in the year was \$14,346,250, against \$14,800,714 in 1892. The higher prices charged for the gas in 1893 was the cause of the decrease. The greatest value of the gas consumed in any one year was \$22,629,875 in 1888. Since that time there has been a gradual decline, with an aggregate of about \$8,300,000 less for last year than 1888. All States show a falling off in the value of coal or wood displaced by the use of gas. The amount of this reduction in Pennsylvania was \$420,000; in Ohio, \$48,000; in Indiana, about \$1300. The largest value in any one year of the gas produced was \$19,282,375 in 1888, in Pennsylvania, since which it has fallen to \$6,488,000. Ohio showed the largest falling off for the year 1893; in 1892 the value was \$2,136,000; in 1893 it was \$1,510,000. The most important gas field in any State is shown to be in Indiana, the estimated productive gas territory in which is about 2500 square miles. While the supply is falling below the demand in other gas fields, it is declared to be well sustained in Indiana, and supplies are being obtained from the State by factories located in other gas territories. The value of the product consumed in the State in 1893 was \$5,718,000, against \$4,716,000 in 1892.

The value of natural gas consumed in California in '89 was \$12,680; in '90, \$33,000; in '91, \$30,000; in '92, \$55,000; in '93, \$62,000.

French Hydraulic Forging Press.

A French journal describes a forging press of very large size, on the Breuer-Schumacher system, which has recently been built by Delatre & Co., at Ferriere-la-Grande, for the Couillet forges in Belgium, and which develops a force of from 1800 to 2000 tons. The press on this system is composed essentially of two parts—the press itself and the compressor. The compressor is formed of a vertical steam cylinder and a hydraulic cylinder, the latter of forged steel. The piston rod of the steam cylinder forms the piston of the hydraulic cylinder, the latter being connected to the steam cylinder and to the foundation by four columns of forged steel, and by hollow cast iron columns surrounding the steel rods, and forming the connection between the head of the steam cylinder and the upper cover. The hydraulic piston discharges the water into the press proper. The distribution is made by a cylindrical balanced valve; as soon as the pressure is released the steam piston falls automatically under the action of gravity. The press at the Couillet forges is remarkable, not only for its huge proportions, but also for its rapidity of action, a speed of 30 blows per minute having been maintained. It is not, however, the largest of the kind yet constructed, since a double press on the same system, having two compressors and giving a maximum pressure of 1000 tons, has just been erected in the Krupp works, at Essen, where it will be used on armor plates.

Building Stone Report.

A report on the valuation of building stone produced in the United States during 1893 has been completed by the special agent of the United States Geological Survey, and shows an aggregate valuation of almost \$22,000,000, a decrease of over \$15,000,000 from that of 1892. "Slate produced during the year was valued at \$2,523,173, of which \$1,472,275 is credited to Pennsylvania. The product of Vermont was valued at \$653,572, and of New York \$204,982. The valuation

of the product of other States is given as follows: Georgia, \$11,250; Maine, \$139,200; Maryland, \$37,884; New Jersey, \$3,653; Utah, \$850, and Virginia, \$117,347. The sandstone production had a valuation of \$5,195,151. Of this amount \$2,101,932 was from Ohio and \$622,552 from Pennsylvania. Limestone production was valued at \$13,920,223. The States having the largest production were Illinois, \$2,305,000; Ohio, \$1,848,063; Indiana, \$1,474,695; Maine, \$1,175,000; Pennsylvania, \$1,552,336, and New York, \$1,103,529."

Battle-Ships Ready.

An official report of the instantly available battle-ships of the six great powers shows that of first-class vessels England has 15, France 9, Russia 3, and the Triple Alliance 10, of which 9 are Italian and 1 German. All the English vessels steam 16½ knots and upward, two being 18½; none of the French is over 16.2, while two of the three Russian are under 16, the third reaching 17.8. In second-class ships England leads with 12, France has 9, Russia 4, and the Triple Alliance 11, of which Germany owns 7 and Austria 4. Here there is no such superiority of speed on the English side, three being under 13 knots, while no French vessel goes so low as that figure and all the Russian steam 14 knots and over.

The Conning Tower of an Ironclad.

The conning tower of a modern ironclad warship is only a bombproof pilot-house whence the ship may be steered in time of action, and is not primarily a safe post where there may be kept an outlook upon the enemy. Conning is a very old word for directing the act of steering a ship. It comes from the ancient word "con," to know, to watch, and the conning tower really comes pretty close to a conning tower, though there may be a certain touch of the whimsical in the idea.—New York Sun.

ONE of the annoyances of several of the most deservedly popular of the type-writing machines is the fact that the carriage has frequently to be lifted, that the operator may examine the work as it progresses. The necessity for this is obviated by a simple device recently introduced and styled the "Typewriter Prism," a rod of polished cut glass fastened to the carriage beneath the impression roller. Two of its slides are flat and inclined to each other at an angle of 45 degrees, and the third side is a strong cylindrical curve, perfectly reflecting the writing and presenting it right side up and in normal position to the eye of the operator.—Scientific American.

THE greatest hoisting engine probably ever built is now being constructed in Milwaukee. It will operate a shaft on the property of the Tamarack (copper) Mining Company in upper Michigan. This shaft is 9400 feet deep, and the engine will be large enough to hoist from a depth of 6000 feet. The drum will consist of a double cone, with the greatest diameter at the center, and tapering toward each end, the smallest diameter being 13 feet 9 inches, the greatest diameter 36 feet, and distance across the face of both cones 24½ feet.

It is claimed that aluminum will soon replace tin for all household purposes. A process for plating aluminum has been devised by a German chemist, which increases its chances of becoming universally popular in household economy.

THE new rifle adopted by the Government is called the Craig-Jorgenson rifle. The Infantry will be furnished first, and, as soon as possible, the cavalry will be supplied with the same arm. It weighs only eight pounds, and will kill a man at the distance of two miles. It is a breech-loader, and has a magazine that will carry five cartridges.

The ball has a speed of 2000 feet per second, and with smokeless powder, with which it will be charged, it is claimed that the bullet will kill a man before the sound of the discharge reaches him.

TALKING of flying machines, *Cosmos*, an English paper, states that "the apparatus of Mr. Lilienthal enables a man to fly without the use of any power but that of the wind. He has successfully flown down from the top of a bill, and has during his flight even risen higher than the starting point, using the wind for power. The machine consists simply of a pair of large fixed wings and a large tail, there being apparently no power used but that of the wind and the balancing of the body."

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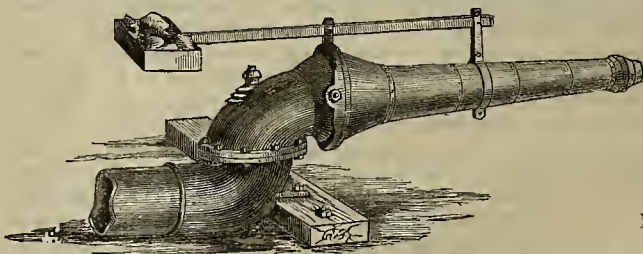
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Electric Progress.

Expense of Electrical Engineering Business.

Sydney F. Walker says in the London *Electrical Engineer*: Probably few electrical engineers, except those who have been in business for a number of years, appreciate how very heavily all electrical engineering work is handicapped by the dead exposures involved in carrying on the work. The remark is true of all engineering businesses, but particularly of electrical engineering. Even the rapid advances, of which all electrical engineers are so proud, add considerably to the cost of working. Some new improvement is made, and not only patterns and drawings, but perhaps a lot of finished work becomes dead stock, of the value of old metal. When, too, as is constantly happening, one firm works out an improvement in some part of their apparatus, every other firm making the same class of apparatus must follow suit, no matter at what cost, or be left out in the cold when orders are given out.

It must be borne in mind, too, by those who think electrical engineering businesses so many veritable El Dorados, returning enormous profits upon small outlay, that the proprietors of an electrical engineering business have to make good, not only their own slips, but those of all their employees, and often those of the employees of other firms. To be successful, you must follow your work, see it kept right, no matter what it costs, or into whose hands it goes. If you do not, any breakdown is attributed, not to the apparatus being improperly looked after, but to the apparatus itself being improperly made. And unfortunately, too, electrical engineers are very much like women, in that they are rarely able to see any good in each other's work. Few electrical engineers, if called in to repair the work of another firm, can resist the temptation to condemn the rival firm's work. And so all these little things cost money, and a good deal of it. And besides all these, as every electrical engineer of experience knows, every now and then something turns up, some new developments of the laws of science that had not occurred to any one before, that often appears at first sight to be contrary to those laws, but which always lead to one result—additional expense, more or less heavy, for the manufacturer or contractor.

And the above are in addition to the regular expenses of all properly conducted businesses. Keeping accounts so that you may know what you are owed, and what you owe, and what your expenses really are, is an important and often a very heavy item in proportion to the business done. Even the correspondence of electrical engineers in business is heavier and more costly than that of other businesses. The thing is new, and buyers often require to be very sure of their ground. Misunderstandings are more likely to arise over work that is quite new to one of the parties concerned than where both are familiar with the principal details. And this necessitates the treasuring up of every letter that one has written or received for years after.

Securing orders is also, if one may judge by what one sees in other lines of business, a far more expensive matter in electrical engineering than elsewhere. Electrical engineers themselves are, perhaps, to blame for a large part of this. No sooner is it known that an order is in the market than the representatives of several firms rush for it, each bent on belittling all his rivals. Tenders, too, are a constant source of expense, and the writer believes affect electrical engineers more severely than any other business. People do not scruple, apparently, on the plea of asking for a tender, to put several firms to heavy expense, often without the slightest intention of employing any of them; sometimes, even, merely with

a view to obtaining information. All these things, and many others, cost money, and unfortunately the sum of them, when added up, bears a very heavy proportion to the amount of business done. With limited companies the amount is usually even higher.

The writer's object in penning this article is to endeavor to deter those who are engaged in electrical engineering businesses from the stupid practice of cutting prices. If you are to make a moderate profit out of your business, you must have a certain average rate of profit on your transactions, such that the sum it furnishes in the year will cover your expenses and leave you your modest profit. If you attempt to cut below this figure, whatever it may be, you will lose money and your business. If you attempt to cut your coat to your cloth, or, in other words, to make a profit by inferior work or materials, you will lose your business as soon as the results of your work have had time to show themselves. If you simply take the loss, carrying out the work as it should be done, you will lose your capital.

Transmission of Electrical Power.

Profs. Houston and Kennelly have made an exhaustive compilation of facts and figures to answer the question, "How far is it commercially possible to transmit water power electrically?"

The question of the long-distance transmission of electricity depends upon two factors: Cost, which includes the purchase and maintenance of the necessary machinery and wires, together with the annual interest chargeable thereon, and electric pressure—the pressure or voltage at which the line transmitting the power can be operated safely and permanently, and with perfect protection of the conductors from lightning, weather and all disturbances. Although water power has not yet been made available at a greater distance than 25 miles, it has been generally considered that it could be distributed commercially at a radius of 50 miles. Messrs. Houston and Kennelly say that, if reliable machinery can be bought cheaply enough, and the conductors can be safely operated at sufficiently high pressure, there is nothing to hinder the Falls of Niagara from stopping steam engines in New Orleans by underselling their power.

A point of the greatest importance is the nature and disposition of the conductors. Three methods have been advocated at different times: The conduit method, in which insulated cables are buried in underground pipes, containing air, or filled with oil; the subway method, in which wires are carried on brackets in an underground passage, as between many buildings at the World's Fair, and the ordinary aerial line method. Within city limits the first or second method would be indispensable, in order to secure safety from accidental contacts with high-pressure conductors; but in the open air, the overhead line is the cheapest, and it can be made, moreover, proof against lightning or sleet. This construction was employed between Lauffen and Frankfurt, and has been adopted in all the long-distance electric transmissions yet constructed. After a careful analysis of cost and the possibilities of electrical machinery, it is demonstrated that the power of Niagara Falls can be transmitted to a radius of 200 miles, cheaper than it can be produced at any point within that range by steam engines of the most economical type, with coal at \$3 per ton; furthermore, that, given a certain output, say 50,000 kilowatts, it might be commercially advantageous to undersell large steam powers at twice this distance with no profit, in order to reduce the general expense upon delivery nearer home. The difference in the transmission radius between small and large water powers hinges on the fact that electrical and hydraulic machines can be built and purchased much more economically in large sizes than in small, so that the cost of

producing and of maintaining one kilowatt is very much less for large than for small water powers.

The Origin of Spiral Wires.

More than one observing person, not familiar with electrical apparatus, has had his curiosity aroused by noticing that, in a great many pieces of apparatus, when installed, the wire immediately next to the appliance has been twisted in a neat coil, not unlike that of a spring. This curious feature is seen in the wire leading to telephones, push buttons, call bells and the like, while it may also be observed sometimes in the heavier wires which are attached to the "hanger boards" of arc lamps. As a matter of fact, these coils are not an essential element in any mechanism, though many believe them to be so; but are simply a symmetrical way of disposing of the slack wire that had been allowed in measuring the distance. So easily do we become imitative in our habits, that this traditional arrangement may now be noticed in a great many places where there is not the slightest necessity for it, and the most striking example is that furnished by a large electric-lighting plant in England, where the huge copper rods leading from the dynamos to the switchboard have actually been tortured into corkscrew spirals, in order to give them some kind of vague resemblance to the involutions attached to the smaller and cruder devices of bygone years. This is another instance of English conservatism, which is still manifested, as Herbert Spencer has noted, in the retention of the lines of the old stage coach in their most modern railway cars.

Another Amperian Rule.

Many rules have lately been published for fixing in the mind the relative directions of the electric current, and the lines of force of whirls surrounding it, and the author of the most recent method, Carl Hering, thinks it more simple and easily remembered than the others. He says that to remember the direction of the magnetic whirls around a current it is only necessary to bear in mind that if the current flows like the ink from a pen (that is, out at the point) then the direction of the whirls will be similar to that of a close spiral encircling the pen, and begun as if one started to write the small letter "m" (magnetic lines). If, however, the whirls be drawn counter clockwise, as though writing the letter "c," the current represented by the flow of ink down the pen will be the one induced by the generation of these lines, as in transformers.

Practical Information.

Figures Show Differently.

In a curious article, "The Number of People Since Adam," the author asserts that "the whole surface of the globe has been dug over 120 times in order to get room for burial places." The *St. Louis Republic* don't believe this, and has gone into mathematics to prove its falsity. In 6000 years we have had 60 centuries, and in each century an average of three generations, or 180 generations in all, each being a generation of 1,500,000,000. Give to each man, woman and child a grave 5 feet by 2, or 10 square feet. A square mile contains something less than 28,000,000 square feet. If this last calculation be correct, you will have to have a cemetery 55 miles long by 10 wide for each generation. Now multiply this by 180, the whole number of generations since Adam, and you have a burying ground large enough for every human being that has died in the last 6000 years.

This vast cemetery, though awful to contemplate, would be but 1800 miles long by 55 miles wide, or, in order to get it in better proportion, say 220 miles wide and 550 long.

In other words, a burying ground containing 100,000 square miles would be sufficient for the graves of every human being that has ever existed. The area of Missouri and Iowa combined should be amply sufficient for such a cemetery, with 22,425 miles left for walks and driveways.

If the calculation is carried out for 100,000 years instead of 6000, it will be found that the cemetery need only be a square of 1700 miles in extent each way. On this basis the United States east of the Mississippi river is large enough to furnish a grave for all the human beings that have died during the past 6000 and for 94,000 years to come.

What Is Chemistry.

Everybody who thinks must be impressed by the great variety of things found on this earth, and the question, What does the earth consist of? must often suggest itself. Among the most important results reached in studying the things around us is this, that notwithstanding their great variety they are made of simple things, and these in turn of still simpler—that there are, in fact, only about 70 distinct kinds of matter, and that all the complex things around us are made up of these seventy elements. The solid crust of the earth, as far as it has been possible to investigate it, all living things, both animals and plants, the air and water, consist essentially of twelve elements. The elements do not, as a rule, occur as elements. They are generally found in combination with one another. Oxygen and nitrogen are, to be sure, found in the air as elements, uncombined; but such familiar substances as water, salt and quartz consist of elements in combination. Thus water consists of hydrogen and oxygen. Hydrogen, the element, is a colorless, tasteless, inodorous and very light gas that burns readily. Oxygen, the element, is also a colorless, tasteless, inodorous gas. It does not burn, but burning things burn with much increased brilliancy in it. When hydrogen and oxygen are mixed together in a vessel under ordinary conditions, no action takes place. They mix thoroughly, forming a mixture that is also a colorless, tasteless, inodorous gas. If a spark is applied to this mixture a violent explosion occurs, and this is the signal of a great change. The two gases have entered into chemical combination; they are no longer the gases hydrogen and oxygen; they have entered into combination and now form the liquid water, a substance with properties entirely different from those possessed by the constituents.

Again, chlorine, the element, is a greenish-yellow gas that acts violently upon other things and causes changes in them. Inhaled even in small quantity it gives rise to distressing symptoms, and in large quantity it causes death. Its odor is extremely disagreeable. Sodium, the element, is an active substance that has the power to decompose water and set hydrogen free. When chlorine gas is brought together with sodium, the two combine chemically and form the well-known compound salt, or, as the chemist calls it, sodium chloride. From this the elements chlorine and sodium can be obtained by the chemist. These two examples serve to show what is meant by chemical combination and by a chemical compound. Chemical compounds are generally found mixed with other compounds. This is shown, for example, in many of the varieties of rocks, as granite, which consists of three different chemical compounds. It is shown much more strikingly in living things, all of which are made up of a large number of chemical compounds, mixed, to be sure, not in a haphazard way, but beautifully adjusted and working together in wonderful harmony. Just as elements combine chemically to form compounds, so elements act upon compounds and cause changes in their composition. Thus oxygen is constantly acting upon other things, sometimes slowly but, in the case of fire, rapidly and with

tremendous energy. It is commonly said that fire destroys things. In fact, it changes their composition, and the principal products of the change are gases. This kind of chemical change is the most familiar that is brought about by the action of an element upon compounds. Compounds, too, act upon compounds, and cause an infinite number of changes in composition. Thus the food we partake of consists of chemical compounds. In the body these compounds find others and they act upon one another so as to repair the wasted tissues and cause growth. The gas known as carbonic acid, that is contained in the air, acts upon the compounds in the leaves of plants and causes changes that are absolutely essential to the life and growth of the plant.

Look, then, in any direction and you will see evidence of changes in composition that are constantly taking place, and that are essential to the existence of the world as it is. These changes in composition and the compounds themselves that are involved in the changes form the subject of chemistry. In the light of what has been said, it is clear that chemistry must be a very broad science. Remembering that chemical action is the cause of the formation of chemical compounds, that without chemical action the compounds would cease to exist, and would be resolved into their elements, it is impressive to think what would take place if chemical action would cease. Most of the things familiar to us could not exist. The solid portions of the earth would, to a large extent, be replaced by the element silicon, something like charcoal, and by oxygen and a few metals such as sodium, potassium and aluminum. Water would be resolved into the two gases hydrogen and oxygen. All living things would fall to pieces, and in their place we should have the gases, hydrogen, oxygen and nitrogen, and the solid element carbon, most familiar to us in the form of charcoal. Life would, therefore, be impossible.—Chautauquan.

They Fall Up and Get Hurt.

The fish that live at enormous depths are, in consequence of the great pressure, liable to a curious form of accident. If, in chasing their prey or for any other reason, they rise to a considerable distance above the floor of the ocean, the gases of their swimming bladder become considerably expanded and their specific gravity greatly reduced; up to a certain limit the muscles of their bodies can counteract the tendency to float upward and enable the fish to regain its proper sphere of life at the bottom, but beyond that limit the muscles are not strong enough to drive the body downward, and the fish, becoming more and more distended as it goes, is gradually killed on its long and involuntary journey to the surface of the sea.

The deep sea fish, then, are exposed to a danger that no other animals in the world are subject to—namely, that of tumbling upward. That such accidents do occasionally occur is evidenced by the fact that some fish, which are known to be true deep sea forms, were discovered dead and floating on the surface of the ocean long before our modern investigations were commenced.—Popular Science Monthly.

THE average senator smokes an expensive cigar. There is a 35-cent brand which sells more readily than any other in the Senate restaurant, and which is in great demand for committee-room lunches. The Southerners, who, as a rule, have to live on meager incomes, are the most expensive of all in their taste for tobacco.

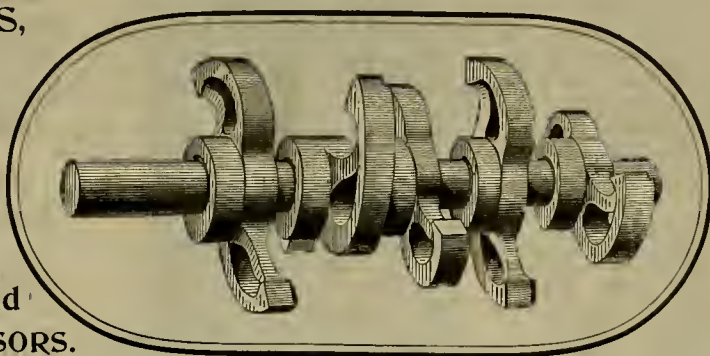
A METEORITE of 267 pounds, found by Prof. A. Heilprin, in 1891, near Godhaven, Disco Island, has been pronounced tempered steel, its extraordinary hardness having possibly resulted from rapid cooling in snow, ice or water. It contains iron, nickel, sulphur, traces of carbon, chlorine, phosphorus and chromium.

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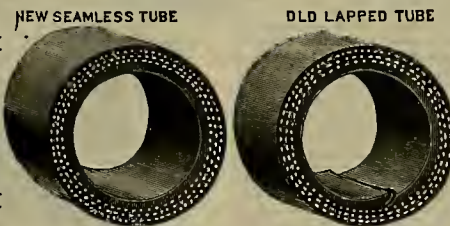


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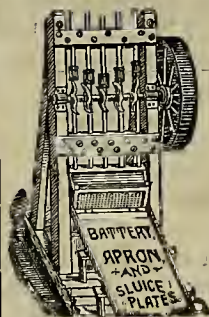
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American Silver Product.

Director of the United States Mint President estimates the silver product of the United States for the calendar year of 1893 at 60,000,000 ounces, which is nearly 2,000,000 ounces more than for 1892. This, says the *Bulletin*, is something of a surplus in view of the great depression in the price of silver last year. The greatest three producers of silver in this country are Colorado, Montana and Utah in the order named, though 15 other States contribute to the total. Four of these are Southern States, and their product is measured by a few hundred to a few thousand ounces. States and Territories producing over 1000 ounces compare as follows:

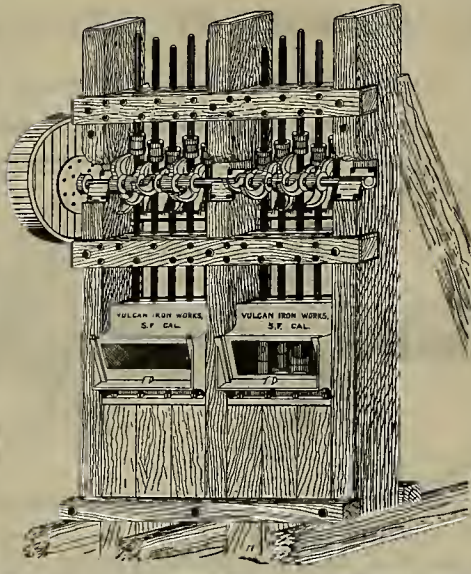
	1892.	1893.
Colorado, ounces.....	24,000,000	25,838,600
Montana.....	17,350,000	16,906,400
Utah.....	8,100,000	7,196,300
Idaho.....	3,164,269	3,910,700
Arizona.....	1,062,220	2,935,700
Nevada.....	2,244,000	1,561,300
California.....	360,000	370,100
New Mexico.....	1,075,000	458,400
Texas.....	210,000	349,400
Washington.....	150,000	152,700
South Dakota.....	60,000	149,400
Michigan.....	60,000	43,500
North Carolina.....	9,000	13,400
Oregon.....	50,000	11,800
Alaska.....	8,000	9,600
Other States.....	1,800	1,700
Totals.....	58,004,289	60,000,000

The product from the other States come from Georgia, South Carolina and Tennessee. The coining value of the product of 1893 is given at \$77,575,757, against a coining value of \$74,995,442 in 1892. This means, we suppose, that if all the silver produced in the United States in the past two years were made up into 412½-grain dollars the product would be as above stated. The commercial value of the silver is of course its gold value, which for both years was much less, that for 1893 not being much more than a little over one-half of the coining value. The coining value of the silver produced in this country is still more than double the coining value of the gold produced.

THE deepest artificial hole in the earth is at Poroschowitz, in the Rybnik district, Upper Silesia. It has been carried to a depth of something beyond 2000 meters (about 6700 feet), and the diameter of the tube at the bottom is seven centimeters. Boring at such depth, and, moreover, through solid rock, was almost impossible prior to the invention of the Mannesmann tube; the greater strength of this tube, as compared with others, makes it possible to use tubes of thinner gauge. It is expected that a final depth of yet another 500 meters (some 1670 feet) can be reached, and a number of interesting observations on temperatures, etc., will be made.

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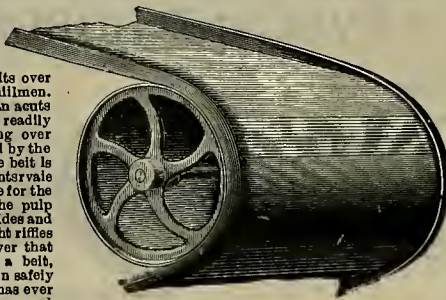
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Mining Summary.

The following is mostly condensed from journals published in the interior, in proximity to the mines mentioned.

CALIFORNIA.

Calaveras.

LIVELY TIMES AT ANOALA.—*Amador Record*, May 17th: They are having lively times in Angels. A number of workmen who were employed in the Lane mine are on a strike at present and threaten to blow up the mine. The superintendent is somewhat apprehensive, and he has taken precautions to prevent the carrying into execution of the menace. The mine has ceased operations, and a guard of five armed men is kept on duty night and day. An outbreak is feared at any time. A vigilance committee of citizens to the number of 600 has been organized to clear the camp of objectionable characters. A number of the undesirable class have received notices to decamp. Some have left already, but others declare that they will remain. The citizens are determined, however, and assert that if they do not depart of their own volition they will be driven out of the town by force.

Los Angeles.

MUCH GOLD IN SIGHT.—*Los Angeles Times*: L. R. Harrison of this city has returned from the Red Rock mining district, 23 miles north-east of Mojave, where he has several valuable claims. Mr. Harrison brought with him a pocket of nuggets to show what he is doing. He says that with primitive dry washers men can make good wages, and if water can be got on the claims, there is high money in sight. The gold is on top of the ground, and the dirt is easily worked. He has great hopes of the Red Rock camp.

Madera.

The works of the Mammoth Mining and Milling Co. are situated in Madera county, this State, on the stage road to the Yosemite valley, and distant from that locality about 60 miles. The ore is rich in tellurium. The power house of the company is one and one-half miles from the mill and mine, on the Fresno river. Eighty inches of water are carried in a flume and ditch, obtaining a fall of 70 feet. The power from the Pelton wheel in use is transmitted by a 900-foot one and one-quarter-inch cable to a three and one-quarter-inch counter-shaft and a 100-horse power generator by a 24-inch belt, generating 1000 volts. B. C. Van Emmens is the electrical engineer of the company. The electricity is transmitted by a wire from the power house to the mill, there being a loss of not to exceed five per cent in the three miles of wire. The shaft is at present 600 feet deep, good ore being found in the north drift. A 10-stamp mill is in constant operation, and the concentrators are doing good work.

Mono.

MINING NOTES.—*Miner*: Supt. Kelly maintains an impenetrable silence relative to the strike in the Bodie, apparently not wishing to take the public into his confidence. The mine is closed to visitors, and we have no means of obtaining information for our readers. It is the prevailing impression, however, that the ore is very rich, but the extent of the body is not known, beyond the fact that last week the ledge was officially reported to be five feet wide.

The Bulwer commenced milling ore at the Standard last week. Five stamps are busy crushing, and it is expected the run will continue till about the 1st of next month.

The Bodie mill is being put in shape for a run on Bodie ore.

Operations on a small scale were resumed at the Mono this week, a few men being put to work to clean out some of the old drifts.

Ore is being hauled from the University to the Miners' mill, which will be started up in a few days.

Nevada.

CLEANUP.—*Grass Valley Union*: A cleanup was made at Gauthier's mill yesterday of ore from the Granite Hill mine. Superintendent Waggoner could not be seen, but it is reliably stated that 50 carloads of quartz crushed yielded \$3200.

Plumas.

BIO YIELD OF GOLD.—*National Bulletin*: Word comes from Prattville that, in five days, Fred Scott had taken from the King drift mine, on the North Fork, the sum of \$700 in channel gold. We are glad to hear such good news. This property is at the lower end of Big Flat, through which, for a distance of nearly four miles, an ancient auriferous channel runs. The Glazier mine is at the upper end of the Flat, and the Angus Cameron mine is near the center.

Shasta.

IRON MOUNTAIN.—*Courier*: Preparations are being made to start up the Lost Confidence mine, which has not turned a wheel since the depression in silver.

Free Press: A rich body of ore has been encountered in the Texe Consolidated mine at Old Diggings. Not long since the fifth lowest tunnel was commenced, which was expected to tap the main ledge at a distance of 1700 feet. But already they have struck ore which assays over \$1000 to the ton.

San Bernardino.

The mill of the Morongo King Mining Company, of which C. W. Allen is president and Judge Campbell is a principal owner, is all completed and ready to start up on a large amount of ore already mined as soon as the pipe line is completed. It is thought that this will be about the 20th.

Word has just reached San Bernardino of a very important strike in one of the mines of the Altuna Mining Company, in the Morongo

district. A tunnel 145 feet long has been run, which tapped the vein at a depth of 75 feet below the surface. At this point a body of rich ore, running from \$200 to \$300 per ton in gold, was found. A drift has been run on the vein about 25 feet, and about six tons of rich ore have been taken out and sacked for shipment. The ore body is about 2½ feet wide and is continuous so far as the development work has been carried.

NEVADA.

Washoe District.

In the Con. Virginia the south lateral drift No. 3, from west crosscut, 25 feet below sill of floor, 1650-foot level, is extended 21 feet. The first two feet are in low-grade ore, the remaining 19 feet in solid ore, and steadily improving in quality. The average assay value is about \$60 per ton per car sample.

The face of the drift is in higher grade ore, the average value of which is now over \$100 per ton.

It is evident that the ore found in this drift is the continuation and extension of ore developed in the two south drifts above.

The weekly ore output is 139 carloads—about 137 tons; the average assay value per car samples, \$39.54 per ton.

The ore was taken chiefly from the two south drifts, 14 feet above; the remainder of lower grade from the vicinity of the winze, 20 feet down. The workings from the Rule drift are in porphyry.

Silver Star District.

Hawthorne Bulletin: Three tons of ore from the Oneida (the first lot milled from the new camp) yielded \$65 per ton in the arrastra last week.

A lot of about 13 tons from Ed Brown's Hardscrabble is at Soda awaiting shipment to the Taylor mill at Silver City. It is expected this ore will mill over \$100 per ton.

Mr. Matthews (expert for Senator and Sam Jones) visited Silver Star last Friday. He says he never saw a camp that showed as much gold for the work done as our new camp shows.

A letter from Arthur George yesterday reports four inches of \$150 ore in the bottom of the Oneida incline, 50 feet deep.

ARIZONA.

A new and fabulously rich gold find is reported in Santa Maris, in western Arizona, and is causing a stampede of miners everywhere. The locators are C. S. Black, J. Bohner, B. Breckman. Twenty thousand dollars was offered a few nights ago for a third interest, and flatly refused by Black. The locators are well known in Prescott and are perfectly reliable men. Miners are very reticent. Four thousand feet of ledge have been prospected and located. The locality is almost inaccessible, and parties are preparing to go out. It is supposed to be the Nigger Ben mine, that men have spent thousands of dollars to find, and years of labor. The new discovery was purely accidental. Years ago thousands of yards of placer dirt were found near the location. Water is not to be had.

FINANCIAL TROUBLES.—*Journal Miner*: The financial troubles of the Henrietta Mining Company still remain unsettled. They are said to have been caused through an agreement to apply 50 per cent of all the hullion taken out on the payment of the mine, and there is scarcely a mine in the world that would permit of 50 per cent of its gross receipts being taken out and then have sufficient left to pay for mining and milling the ore and for development work in the mine. The employees of the mine are said to be in possession of the last cleanup of hullion, amounting to \$2000 or less, which they are holding until they receive their pay for work. Honest and reliable miners, who have been employed in the mine, state that it is no fault of the mine that the present difficulties have arisen. Just prior to the closing down of the mine a large body of ore was struck, which gives an assay value of over \$100 per ton in gold.

A new mining venture, and one which gives promise of success, is that of Messrs. Buchann, Little and Rice in Buckhorn gulch, a tributary of Castle creek. It is a placering proposition, and one that is to be thoroughly and somewhat extensively worked. The first shipment of machinery was taken by wagons yesterday, and is to be followed by another immediately. The promoters of this enterprise have thoroughly tested the diggings and will adopt the old method of eluding the ground, an abundance of water being secured adjacent, which will be conveyed to the claims by pumping machinery that is now on the road. That section has been the scene of considerable placer mining by Mexicans in years gone by, but as it was of a purely surface nature, no reasonable idea could be formed of the value of the ground at bed-rock until these energetic men made a "sample run." The new plant will be in operation inside of a month.

TO SMOKE LEAD CARBONATES.—*Arizona Citizen*: The lead carbonates for Colorado smelter average about 8 per cent lead, while for good work melting they should run at least 12 per cent. In Arizona are some large bodies of lead—two in particular, one of which will run as high as 60 per cent. A prominent melting company has in view the removal to Tucson, or the building of branch works here. They have a great deal of ore from Arizona, and know the field well justly them. Should it be built they want it to take in all Arizona, and not be merely a local affair. For this they want direct railroad communication with the Sonora ore fields, also with the great ore bodies of northern Arizona.

BRITISH COLUMBIA.

YALE DISTRICT.—*Kamloops Sentinel*: A party of three prospectors who came from California a short time ago, passed up the North Thompson river lately with a pack of eight animals.

They propose going as far as the headwaters of the Clearwater. They will be gone all summer and have a good supply of provisions.

The Prince Albert Flat Hydraulic Mining Co. has now the monitor working on its property near Yale, but so far has been removing comparatively barren ground to get to where the pay dirt is expected to be found. The cost of putting on the water was comparatively low and high profits are expected.

COLUMBIA RIVER PLACERS.—*Kamloops Sentinel*: Messrs. Parker and Leavenworth of Seattle, representing a New York syndicate, have decided to take over the large area of placer ground, starting from the boundary adjoining Fort Sheppard and running south along the Columbia river for two miles. They will at once commence the building of a \$30,000 ditch, to bring the water onto the ground from Cedar creek.

It is reported in a Victoria paper that the trial made at Yale by Bell & McCastle's gold dredger fully realized the highest expectations of the prospectors. Working in 12 feet of water gold gravel was pumped up from the bed of the river, which yielded 194 ounces of gold in a 36-hours' run. Stones weighing 25 and 30 pounds are brought up by the pump, and the whole machinery works perfectly.

COLORADO.

THE COLUMBUS MINAS.—*La Plata News*: Supt. McDermott will soon commence work on the Columbus mines. Horses will be built, the road repaired and a tunnel started below the falls and run 800 feet, which will give a depth of about 300 feet. Last fall this mine was examined by Mr. McDermott, who was highly pleased with it. He took 500 pounds of the best ore to Denver, from which, it is said, he obtained a gold brick worth \$16,000. This he took to Chicago and organized a company to buy and work the Columbus. The company took a bond and lease on the mine. A working capital of \$100,000 is available, and plainly indicates that the company means business.

THE JACKSON PROCESS.—Tests by the Jackson process for the extraction of the precious metals have lately been made at Lake City, fully demonstrating that ores costing \$15 per ton for smelting can be treated by it for from \$4 to \$8 per ton. The following description of the process has been handed the *Record*: "The ore is pulverized to 50 or 60 mesh fine, then roasted till the volatile impurities are driven off and the ore becomes sweet. A mixture of ores are generally used, so that one may act as a flux to another. After roasting the ore is chloridized, cooled and placed in tanks, where the base metals are dissolved out with water, leaving the gold and silver as chlorides, which are dissolved by a solution composed of hyposulphite of sodium and salt. The gold and silver are then precipitated by electricity, the precipitates are then washed, dried, melted and run into bars ready for shipment." The West End Gold Mining Company, at Sherman, on whose ores the test was made, will, as soon as plans can be prepared, erect a plant of 50 tons daily capacity and operate it under the process.

An excitement has been created at Cotopaxi by a large gold find which was made 18 miles north of that place. The specimens exhibited are rich, and there was a rush for the new field.

SOLD AT SHERIFF'S SALE.—The Railroad Boy mine and mill site, the Independent mine, the Denver and the Clear Falls mines, the property of the Gold King Mining and Milling Company, and located at Salina, have been sold at sheriff's sale, under three separate executions, to Mary G. Arnett, of Boulder, for \$3923.44. This same property was held at \$150,000 last year.

WORKING ZINO MINAS.—The old zino mines at Cotopaxi have resumed operations. Ten men are employed.

CLEAR CRAK.—The Empire correspondent of the Georgetown *Courier* says: Empire's mines are showing up well. The Crown Prince has a large streak of \$30 iron ore. The Cleopatras is truly a mine of beauty and has a fine streak of quartz and iron worth from \$60 to \$100. The quartz streak in the Badger Boy is as big as ever, and in the language of Mr. Clark, is simply red hot. The Gold Dirt streak gets larger as the boys go down on it, and is worth \$70. The streaks in the Tenth Legion have not pinched out by any means, and the iron is worth \$25 to \$75, while the quartz is worth from \$100 to \$160 per ton.

COLORADO SPRINGS.—The statement of the *Gazette* that there were 800 idle, starving and desperate miners on Bull Hill is being severely censured by mining men. Those best posted say that there cannot possibly be over 200 or 250 men idle because of the strike, and those could secure work at \$2.75 per day for eight hours if they chose.

PARK COUNTY STRIKES.—*Denver Record*: A report is just received from Alma, Park county, that a wonderfully rich strike has been made in the U. P. and K. P. gold mines in Mosquito gulch. Assays from select ore run as high as \$6000 per ton. It is claimed that the melting mill will average several hundred dollars per ton with a high body of rich milling ore. These are contact veins of porphyry and lime, and porphyry and quartzite. A carload of this will be shipped in a few days. A report also comes of a new body of ore of higher grade than usual in Black Flag, situated between the U. P. and K. P. mine and the Macotte gold mines.

TELLURUM.—One hundred and seventy sacks of tellurium ore have arrived at Creede, from the Good Hope mine at Bear creek, and was shipped to Denver. This ore is estimated to run about \$700 to the ton. Assays have been had from ore at the grass roots from Bear creek, giving 13 ounces in gold per ton.

THE GOLD FIELDS OF ALMA.—Placer mining is now under full headway at Alma, Fair Play,

Beaver creek and Tarryall. At Alma, day and night shifts are on, new flumes and ditches have been constructed, and the great streams from the nozzles of the hydraulics are tearing down the banks of gravel and gathering the gold as no other process can. The dirt being washed at the new workings is the richest yet encountered, and this year's harvest will surely be a rich one—richer than those of past years, which are said to have yielded an average of \$20 per day to the man for the season.

One of the good indications of the present is that there are no idle men around Alma, and few, indeed, in the county. They are all at work—if not on a wage scale, they are leasing, prospecting or developing properties.

This side of the county has many mines that should be worked—mines that are developed and proven, mines that have great ore bodies in sight, and that, carefully managed, would pay big dividends. Among these is the London of Mosquito, directly between Alma and Leadville, one of the greatest mining properties of the State, but unfortunately owned by Eastern millionaires who do not care to work it. The property is well developed, has a fine mill at the mine, and eight miles of road tap Mosquito gulch from London Junction to the mill, its own property, aside from a tramway from the mine down to the mill. From this group gold ore was exhibited at the World's Fair which yielded over \$40,000 per ton. It may also be added in proof of the richness of gold in these districts, that gold ores from Mount Cross have been marketed in the past, giving returns as high as 600 ounces, the same ore containing 500 ounces in silver.

The Lee Gos and First National, Montgomery mines, belonging to the Green Mountain Mining Company, which have many thousands of tons of gold and copper ores in sight, are expected to be put in active operation this season.

TARRYALL DISTRICT.—Warm weather and rain have hastened the disappearance of the snow in the Tarryall district, and mining operations have taken on new life. New cabins are being built, and work on the new stamp mill is progressing fast. Streams are now running, making placer work possible. Leland Peabody is employing 40 men on his placers in washing, in addition to a force of men employed in the construction of an immense reservoir. Mr. Peabody has employed Chinese in washing gold for a number of years past, but this year he has given preference to white men.

IDAHO.

POORMAN.—*Avalanche*: The rich ore in the north drift of the Oso in the adit tunnel continues without change. A raise is being made for stopping. In the south drift a nice streak of ore is coming in on the hanging wall which promises to equal that in the north drift. We were permitted by the management to look at the assayer's report from samples taken from the east or hanging wall, which were as follows: No. 1, 561.2 ounces silver and \$1232 in gold; average, full 50 feet, 636 ounces silver and \$864 in gold. Picked samples would, of course, assay much higher. In the Oso, or No. 3 tunnel, drifting and stoping is being done. The face of the drift is all ore, the full width of the tunnel. In stope No. 1, they have opened a lot of "Poorman butter," or "mineral talow," which is full of nuggets. This ore is a characteristic of the old Poorman. New stopes have recently been started, numbered from one to eight inclusive. Each stope is 50 feet in length, all connected. The ore body varies from twelve inches to the full width of the vein. In one stope there is not sufficient waste to keep the "floor" up, making it necessary to blast into the walls to obtain waste for that purpose. The outlook on the Poorman is most flattering. The mill is pounding steadily.

ORO FINO MINAS SOLD.—*Avalanche*: The Oro Fino mines, limited, have been sold by the sheriff to T. Regan at \$159,362.88. The Oro Fino is one of the large properties of War Eagle mountain and the last on the far-famed Chariot vein to be worked. We attribute the cause of the company's failure to the large amount of water which it had to contend with in working the mine. To raise the water from the Oro Fino it was necessary to drain all the adjoining properties, as the vein is open and accumulates water rapidly. With a tunnel tapping this vein from South Sinker, draining the same, every property on the belt could be worked at a profit. Unless we misread our guess, preliminary work upon this enterprise will be started this summer; and if started, will be pushed rapidly to completion.

CRUSHING QUARTZ.—*Democrat*: The first quartz mill ever put up in the immediate vicinity of Boise is now and has been for some time dropping stamps within five miles east of town. It is crushing rock taken from the ledge bought of James Flanagan, and is said to be doing splendid work. Ten or twelve tons per day are crushed. Fifteen men are employed in the mine and mill, and the rock taken out is reported to be fine.

MONTANA.

PROSPECT THE DRY GULCHES.—*Dillon Tribune*: If you go prospecting this summer, and it seems quite likely to be the occupation of a good many men, give the numerous dry gulches which abound in these mountains an examination. It is the theory of the man on whose suggestion this is written, that the dry gulches are as likely to contain pay gravel as are those containing living streams. At any rate the matter is worth looking into, and if you strike pay and cannot work the ground yourself for lack of water, you can find some one with means who will take it off of your hands at a remunerative figure; there is no doubt about that.

The Bimetallic Mining Co. of Phillipsburg is remodeling its plant for the purpose of leaching the tailings belonging to them and also those of the Granite company, aggregating

about 400,000 tons. This plant will have a capacity to leach some 300 tons per day by the Russell process, which has already been tested and found a success. It is probable that the Bimetallic company will adopt the Russell process in treating its ores and thus do away with the amalgamating machinery in its mill. These improvements to the plant have been in process of construction ever since last fall and will be ready to begin operations in 80 or 90 days. The erection of a building for the leaching works, etc., will, when completed, have cost about \$75,000, and it is probable that later a plant for refining the bullion, similar to the Marsac machinery at Park City, will be put in.

AROUND BUTTE.—*Inter-Mountain*: All the mines of the Butte & Boston company which suspended work owing to the Great Northern strike have resumed and are being worked as usual. Owing to the absence of Captain Couch of the Boston and Montana, the usual number of men at some of these properties are not now employed, but it is believed that shortly all of the mines will be worked by a full complement of men. The copper market is improving, the demand for electrolytic copper continues and prices have been fairly satisfactory. Everything points to an active season's work in the copper industry, and the inquiries for copper properties by Eastern capitalists speak well for the future of this locality.

The Anaconda properties are being worked on their usual magnificent scale, and regular shipments are being made to the smelters. The new converter plant, which has a capacity of turning out 10,000,000 pounds of copper each month, is hard at work.

Among the silver producers of the district there is very little activity. At the Czarina and Jennie Dell the rich strikes recently made at these properties will keep the lessees busy for a few months, but at the present price of silver there will be no big money in it for anybody. A number of leasers are yet engaged around Walkerville and west of Missoula gulch, but beyond the fact that they are working hard to open up pay ore ground, they have nothing to report.

Placer mining will engage the attention of a larger number of prospectors this year than ever before. The water supply for the season will be adequate for all purposes on account of the heavy snowfall of the past winter, and few districts where colors exist will be neglected. There is said to be good diggings over in Granite county west of Phillipsburg, but as this season for work is short and the distance to bedrock great, little work has been done there. A number of Butte men are now outfitting for a trip there when the snow goes off the mountains, and they will no doubt thoroughly test that section for gold deposits.

NEIHART.—*Area*: Andy Nelson and Duncan McDonald have gone to work on their lease on the Cornucopia. They have been prospecting around the property with a view to find the most promising place to work in. Considerable ore has already been taken out by these gentlemen, and by the time the railroad is running again they expect to make quite a shipment.

The Grand Prize and Enterprise have been leased and bonded by James Garner and Wm. Rutkins. This property is located at the head of Rock creek and belongs to J. L. Neihart and Wm. Crandall. Very rich float was found all over these claims and two veins of good ore discovered. A tunnel 350 feet in length has been run on one of these veins and a depth of 125 feet gained. The ore in this vein is not very high grade, but it is hoped to find something better either further on in this vein or on the other, which has not been opened up to any extent. The lease and bond run for a year and the price stated in the latter is \$52,000.

ELK CREEK MINING DISTRICT, DEER LODGE COUNTY, MONTANA.—*Anaconda Review*: Twenty years ago Bear gulch was famous for its rich production of placer gold. Inside of three years three gulches were completely undermined by ground sluices, bedrock drifts and surface mining. Only the cream of the gulch was taken out. If the ground would pay \$20 per day to the man it was considered fair diggins; anything less was left. Wages were from \$10 to \$12 per day, and everything else in proportion. To-day \$3 a day to the man is considered enough to pay working the ground over.

The Bear Gulch Hydraulic Mining Co. have three miles of ground patented in Bear and Deep Gulches, through which they are running a bedrock flume, for the purpose of cleaning up all the ground as it comes in these gulches. They have perfect control of the water and every foot of ground from the face of the side mountains to bedrock is carried through the flume by 800 inches of water, divided into two pressure pipes and two waterfalls into the head of the ground sluice.

Last year they cleaned up \$20,000 in three months, about half of the time being devoted to work on the flumes and the construction of a tunnel 300 feet through a mountain peninsula in the gulch to get grade for a tailings dump. This has been accomplished, giving them dump ground for 25 years, if necessary, to work out the two gulches.

BASIN.—*Times*: The Lone Star put its machinery in position this week, the water was pumped out of the shaft, and the work of sinking to the 100-foot level was resumed. There is not much water to contend with, and work is progressing rapidly.

The Empire lode is situated just east of the Mantle. It has a vein of ore about three feet wide that will assay \$28 in gold and \$6 in silver. A tunnel is in a little over 100 feet, and a shaft is down 30 feet, and the ore looks good in both places. The claim adjoins the Champion on the west.

James Judge and Jack Wall have an immense amount of free-milling ore in the Mountain View, going from \$3 to \$6 per ton in gold on the surface. They have a 30-foot shaft on

the property and 60 feet of a tunnel, but it will have to be run 40 feet farther before they will strike the pay chute under the shaft.

NEW MEXICO.

The Ivanhoe Mining and Smelting Company's smelter at Ivanhoe is running. The smelter is turning out five tons of copper matte every 24 hours. This matte carries 60 per cent copper, 40 to 50 ounces silver and one ounce of gold per ton. The ore body in sight in the mine is over 20 feet in width, and sufficient ore is now developed in sight for a year's constant run.

The Texas mine shows no diminution of the ore bodies. Another shipment of rich ore is nearly ready to send to the smelters. The returns from the last shipment of two lots of ore and one lot of concentrates were as follows: Ore, Lot No. 1, 338 ounces silver and one ounce of gold per ton. Ore, Lot No. 2, 274 ounces silver and one ounce of gold per ton. Concentrates, 407½ ounces silver and 74 ounces gold per ton.

The Silver City *Enterprise* says that one of the biggest strikes ever made in New Mexico has been made in the Graphic mine at Hadley, near Cook's Peak. The new strike is on the 625-foot level, and the ore body is the full width of the drift, over four feet in width. The ore is richer and of better grade for reduction works than any ever found in the mine before. T. G. Condon, of Colorado Springs, president of the Silver City and Northern railroad, is largely interested in the Graphic. From all indications the new ore body is of great extent.

THE CHAMA PLACERS.—Photographer T. J. Curran has returned to Santa Fe from the Chama river, where he took some 20 views of the Bucyrus placer Company's new mill and 12 views of scenes along the river, showing those immense deposits of gold-bearing gravel. He says the success of the Bucyrus principle of saving this fine gold has been fully demonstrated by this mill, only it is found that the machinery in some parts is too light to make the profits what they should be. Accordingly, Robert Hunter and his New York backers are now having built at Buffalo a mill that is four times stronger than the one now in use. Mr. Curran also met Mr. Joyce of Montreal, partner of A. Cockburn, who has extensive placer holdings on the Rio Chama. Mr. Joyce says a \$40,000 Bennett machine will be in operation at their camp shortly. It will be put in on a guarantee to save the gold and will be run by electricity.

THE LEGAL TENEE.—What is reported to be a valuable strike has just been made in the Legal Tender mine, in the Moreno district, four miles from Elizabethtown. They have a 240-foot tunnel in which is uncovered a two-foot vein of ore which mills \$200 in gold, with 60 ounces of silver and from 8 to 10 per cent in lead. C. W. Watson, late of Colorado, is pushing developments on this mine.

OREGON.

Democrat: A rich pocket was found last week in pursuing work in the long tunnel of the Connor Creek Mining Co. The amount of gold taken from the pocket is valued at \$90,000 and the last of the golden treasure was taken out last Saturday evening. The Connor Creek mine up to about two years since was a steady producer of from \$20,000 to \$40,000 per month; but finally the ledge was lost, since which time Capt. Myrick has had a force steadily employed running a large tunnel in the hope of tapping the old vein at greater depth. The tunnel is now about one and one-half miles long. It is in this tunnel that the find of last week was exposed. Such a find is truly wonderful, but where pockets exist the treasure vaults may contain a larger as well as a lesser amount. Gold is where you find it and in peculiar shapes, form and quantity.

Courier: J. C. Lewis is now running three tunnels night and day on Mt. Reuben. One of these bores is over 400 feet in the mountain, and the owners think 200 feet more will strike the ledge 1000 feet below the surface. The ledge has been followed on its highest level by a 600-foot tunnel, and the lode proves from 12 to 30 feet in width. This will be the deepest mine in Oregon when finished.

SOUTH DAKOTA.

REVIVAL OF PLACER MINING.—Deadwood *Pioneer*: Since the revival of placer mining, there has been more placer gold sold in this city than at any time since the palmy days of 1878 and 1879. The banks, jewelry establishments and assayers buy large quantities daily. Every creek in this part of the Hills is dotted in length with flumes. The revival of this class of mining was caused by the closing down of the Central and Terraville mines. The miners were compelled to earn a livelihood, and this being a means, accepted the means with more success than was anticipated. Of course no such returns are gathered as were in the virgin bare of the creek in the early days, but nevertheless \$5 per day is easily gotten per man, and in some places even more. From the early days until a few days ago placer ground that would not produce richly was let severely alone, but now this mode of mining is resorted to for a living and it bids fair to grow into an industry that will add greatly to the gold production of the Hills for 1894.

UTAH.

Tintic District.

HAVE A BONANZA.—*Park Record*: Every man who has lived in Utah any length of time knows of the famous Copperopolis mine at Mammoth, in the Tintic district, and of the large amount of rich ore it has produced. Many have also heard of the Champlain claim adjoining, which has been worked for several years by different parties under lease and bond. A controlling interest of the latter claim recently came into the possession of W. I. Snyder and

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Judge Henry Shields, of this camp, and has been worked by them under the management of J. M. Sullivan, and with a full knowledge that the Copperopolis people were taking ore out of their ground, for they could plainly hear the men working beneath them. Thursday of last week the men working under Mr. Sullivan broke through, having followed the ore for many feet. The result was that the owners of the Copperopolis procured an injunction from Judge Smith of the First District Court at Provo, restraining Messrs. Snyder and Shields from taking ore out of their own ground, and setting May 19th as the day for them to appear and show cause why the injunction should not be made permanent. The gentlemen anticipate a stubborn fight, for the ore in the Champlain is very rich in gold, for two shipments recently made by the Copperopolis of ore stolen from this ground averaged \$10,500 per ton for one lot and \$3000 per ton for another. The ground is worth fighting for, and the Champlain people propose to have their rights if it is possible to obtain them in the courts. They have demurred to the injunction issued against them, applied for an injunction against the Copperopolis people, and planted a suit for ore extracted from their ground in the sum of \$200,000.

WASHINGTON.

MINES AT BOUNDARY.—The Columbia Consolidated Mining Company, composed largely of citizens of Spokane, has transferred to Parker & Leavenworth of Seattle, the agents of an Eastern syndicate, its \$125,000 treasury stock, in consideration of which Parker & Leavenworth have agreed to build a canal, starting at the forks of the Cedar creeks, and to extend far enough to supply water to enable the Columbia Company to thoroughly placer mine their entire 800 acres of land, which huge the Pend d'Oreille and Columbia rivers. It is estimated by the Company's engineer that this canal will cost about \$35,000 in excavation, pipe, machinery, etc.

The Civil Service Gold Mining Company, organized and incorporated under the laws of the State of Washington, with a capital stock of \$100,000, and which is composed of capitalists of Washington, Montana, South Dakota, Kansas and Kentucky, has opened its main office in the Chamber of Commerce and Mining Exchange building at Boundary. The company controls the Margaret, Sarah C, Golden Treasury, Rosebud, Willie M, Mikado, Hattie, Madre d'Oro and Gold Rock.

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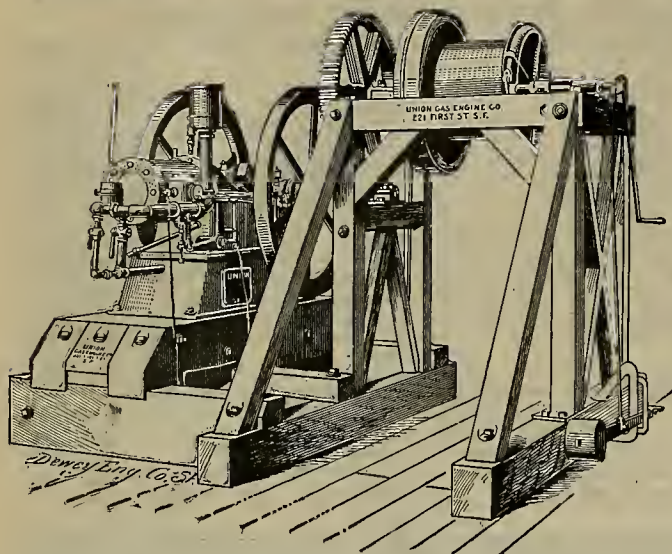
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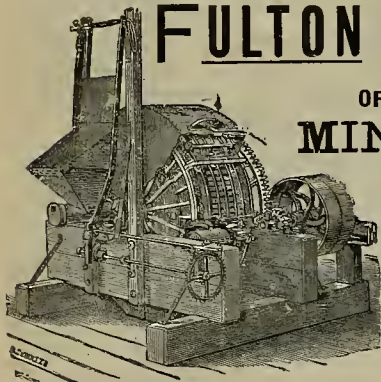
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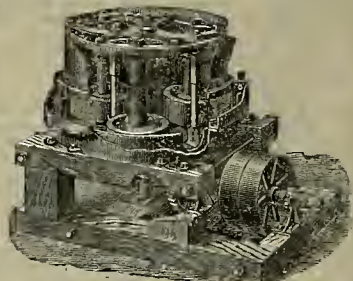
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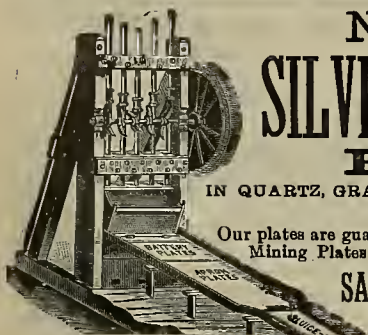
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Automatic Cut-off Steam Engine.

On this page is an illustration of a single valve cross-compound automatic cut-off steam engine patented and manufactured by Byron Jackson of this city. It is cast on a sub-base, high enough to clear the belt wheels from the floor. One wheel is left out of the cut to show the engine better. The engine can be changed from condensing to non-condensing, though it is as well to add the expense of a condenser.

A notable difference between this and other compound engines is the absence of any kind of extra pipes, passageways or receivers between the cylinders. Ordinarily it has been thought necessary to have an extra pipe or passageway of some kind through which the steam must travel from one end of the small cylinder to the opposite of the large cylinder; and when the communication is open at the end of the stroke, the steam passing from the small cylinder has to expand and fill the passageway or receiver before it enters the large cylinder; and if this passageway or receiver be large, the steam suffers a reduction of pressure which may be so great as to partially neutralize the gain by expansion.

In the engine illustrated there is no extra receiver, no extra pipe or passageway of any kind. The live steam enters the small cylinder, passes through the post and valve chamber into the low-pressure cylinder, and thence into the valve-chamber through the center of the valve to the exhaust at the end of the valve-chamber. This exhaust may be piped away from either end of the valve-chest as convenience requires, being usually connected at the front end under the engine, leaving the back end of the engine clear and readily accessible to the valve and pistons without removing any pipes. The valve being located below drains all condensed water from the cylinders. It is claimed that the engine having steam furnished from a plain horizontal tubular boiler properly set and properly fired will not consume over two pounds of combustible per indicated horse-power per hour.

THE situation in the Cripple Creek, Col., gold district is a deplorable one. The mines are held by men who do not own them but who threaten to injure the works and attack any and all who seek to get possession of their own property. The tone of the Colorado papers is that the miners are in the right. This view is probably due to their surroundings. The broad fact remains that any man has a right to do as he pleases so long as he interferes with no one else's right to do as he pleases. That is liberty. Anything else is either despotism or anarchy, and there is little choice between them. Doubtless the miners at Cripple Creek have their rights and their

wrongs, but their methods cannot be endorsed. They are opposed to American principles, and, like the disturbances among the Pennsylvania and Ohio coal miners, are the bitter fruit of blossoms blown to us from across the sea.

FAILING health is given out as Major Powell's reason for retirement from the position of Chief of the United States Geological Survey. Mr. Chas. D. Walcott, Chief Geologist, succeeds him. The intimate relationship between the position and public mining and irrigation interests makes the matter an important one. He is reported to have said that he will conduct the work along the lines

Gold Production.

Current statistics of the country's gold product in '93 estimate it approximating \$36,000,000—\$3,000,000 more than '92. The silver product for '93 is estimated at a little over \$78,000,000—a decrease of \$6,000,000 from the previous year. The returns published in these columns last week show the yield of gold in Australasia for '93 to be 1,876,561 ounces. Giving this a value of \$20 an ounce would make that worth \$37,531,240. It will be observed that Australasia produced more gold last year than the United States. For the first three months of '94 the Wit-

watersrand district in South Africa has produced 467,056 ounces, an increase of nearly 50 per cent over last year. The South African gold, so reputed, is about 0.82 fine. If the African output is kept up during the year the total will be about that of the United States for the same period. The average annual gold yield of the world for the last ten years has been \$32,000,000.

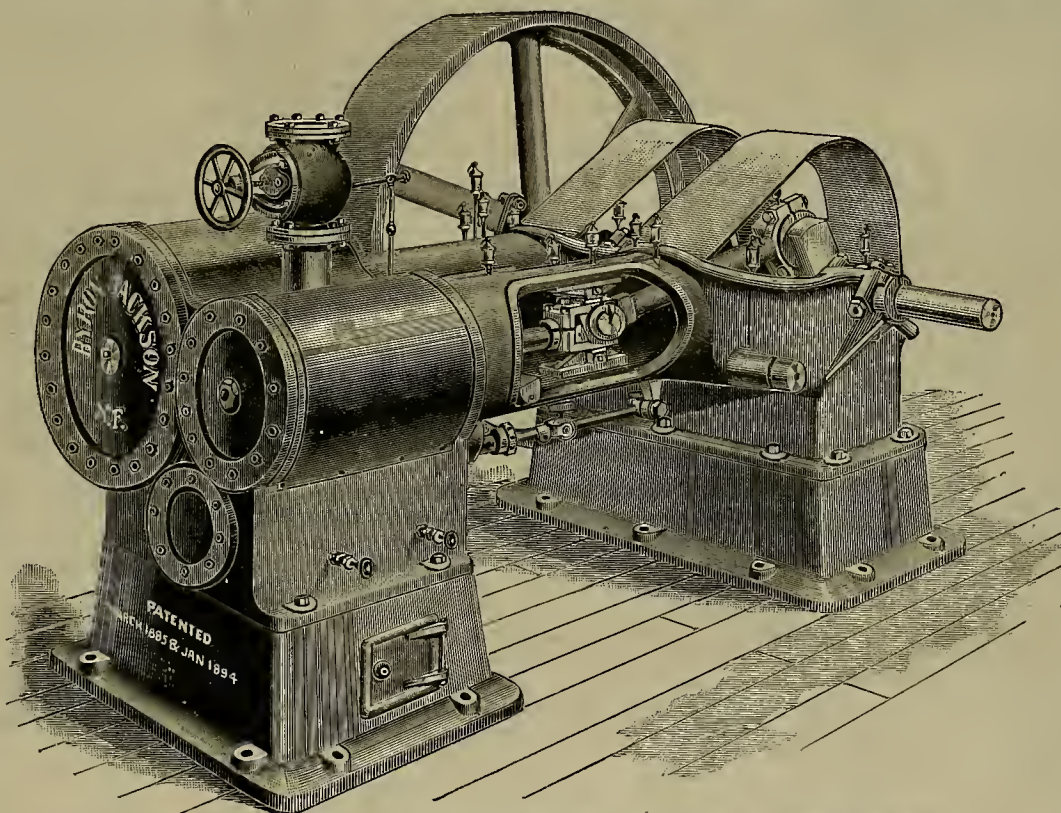
THE London Mining Journal proposes to solve the silver question by stopping all mining of silver and producing gold in such quantities that there would be an "over-production" of the yellow metal, thus enhancing the price of silver. It says "the remedy is transparent." It certainly does seem decidedly "transparent."

GOLD exports still continue in millions. Several causes are assigned—realization on American securities; "the balance of

trade"; money in better demand in Europe than here; light supply of commercial bills against exports of products to Europe, etc. 'Tis thought the tide will turn in the early fall and flow the other way.

The phenomenon known as "electric sunstroke" is now attracting special attention by reason of its frequency among workmen employed in melting metals by means of the electric process. The intense voltaic arc between the carbon and the metal to be melted emits rays, producing a sensation similar to that of a burn on uncovered portions of the body. There is frequently great pain, sleeplessness and in some cases fever. The skin becomes copper-colored or bronzed, the eyesight is sometimes temporarily lost and followed by what is known as "yellow vision," with a sensation as of sand under the eyelids.

FIVE DOLLARS a day is the quoted wages paid deputies in the Cripple Creek, Col., district. This is a great depreciation from the old days in Pioche, Nev., when no fighter would take hold for less than twenty dollars a day "and expenses." Probably the same relation exists as to the value of the service rendered.



JACKSON'S SINGLE VALVE CROSS-COMPOUND AUTOMATIC CUT-OFF ENGINE.

laid down by Major Powell. That gentleman's policy, while positive, was not at all times deemed progressive or satisfactory by those whose interests were involved, and it is possible that a modification of the late Chief's views would be in line with speedy and satisfactory settlement of important questions involved in the development of our natural resources.

CONSIDERABLE stir is being made over the inroads that electrolysis is making in the gas and water mains of this city. It transpires that by reason of lack of return wires on some of the electric street railways there is occasioned electrolytic corrosion of gas and water pipes. Though treated sensationally and exaggerated in some of the newspapers, it is evident that in several cases where the trolley system is used, the condition of pipes in the vicinity shows the necessity of guarding against electrolysis.

LAST week the city of Boston placed a loan of \$500,000 for a period of ten years at two per cent per annum. The State of Massachusetts has sold \$500,000 bonds drawing three and one-half per cent at 109. In Chicago call loans can be had at two per cent.

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San Francisco, June 2, 1894.

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A Notable Decision.

A decision of great importance to the mining interests of the west half of America was made by the Supreme Court of the United States this week. The case was Barden, et al., vs. the Northern Pacific Railway Company, and was decided against the company. It involves millions of dollars, and the verdict is in accordance with law, justice and equity.

The Northern Pacific's land grant was practically forty square miles for each mile of road built. Barden and associates discovered silver on a tract included in the railroad land grant and brought suit, the case being a test one. The railway people held that while they might be deprived of any part of their grant on which gold, silver, lead or copper was known to exist at the time the grant was made by the United States patent, that any subsequent discovery of metal could not affect their title to that or any portion of the grant. The plaintiffs pointed to the act itself granting the land, and after the usual interminable delay the case reached the highest court in the land, where it has just been decided (Justice Field of this State delivering the opinion), that the original exception of mineral lands at the time the Government made the grant was without any qualification, and that in giving that land to the railroad company all mineral lands, known or unknown, were specifically reserved to the United States.

It is a great victory for the miners. The thing is settled. There is no appeal, and hereafter, within the limits of the Northern Pacific Railway grant, or any other railway grant in the country where gold, silver, etc., is found, miners can acquire title to such land in the ordinary way undisturbed by tedious and costly litigation. The far-reaching consequences of the decision of the Supreme Court are manifest. It is of immense value to our mining interests and in every way satisfactory.

Now that this point is settled and settled right, it is in order to have an act passed by Congress setting forth exactly what "mineral land" is, in plainer and more precise terms than those of the present statute, so that the last faint possibility of future dispute may vanish.

The Dixon-Hartman bill is now on the House calendar, having been reported favorably by the House Committee on Public Lands, and has been held back by its friends awaiting the fate of the suit just decided in favor of the miners. This bill provides for the classification and segregation of mineral lands within railroad grant limits, and provides means for restoring such lands to the public domain. The passage of that bill is now believed to be certain. Of course there will be contests in the future, but in such future litigation it will not be the individual against the railway company; it will be the railway company against the Government.

The opinion was not a unanimous one; Justices Brewer, Gray and Shiras dissented.

Salmon River Mines.

Salmon River district, the southwestern portion of Siskiyou county, is a promising field for both the mining investor and prospector. The placer deposits of its river beds and bars early attracted a considerable population and have been moderately productive for nearly 40 years, and still remain so. At the present time the yield is principally from high bars and benches to which water has been brought by ditches often at a considerable outlay of time and money. These deposits, though not extensive when compared with the immense masses of auriferous gravels of the western slope of the Sierra Nevada, are amply rich enough to repay the investment of capital. At the head of the South Fork of the Salmon at Summerville the benches and bars paid well by hydraulicking for many years, and have only in the last two years been worked out and abandoned. The extension of the ditches used to supply water at Summerville will provide a water supply for a number of similar deposits farther down the river at Cecilville. Still lower down, at the mouth of Knownothing creek, the Red Point mine, a high bench deposit, is being hydraulicked very profitably. On the North Fork of Salmon river, at the mouth of Russian creek and above, are some extensive bench deposits that are as yet untouched, only awaiting the bringing in of a water supply. These deposits have been thoroughly prospected and will pay well hydraulicked. The water supply of the North Fork is available with a short line of ditch, so no large investment of capital is required. Elsewhere on the North Fork, and on the main river below the junction of the Forks, are several other hydraulic properties that will justify working on a much more extensive scale than at present.

The permanent promise of the district is, however, in the development of its quartz-mining industry. This is yet in its infancy, despite the extensive exploitation of a few mines that have made more than a local reputation. The entire drainage area of the Salmon does not contain gold-bearing quartz veins, as might be inferred from the distribution of the placer deposits. The limits of the gold-bearing quartz districts are fairly well known already, though there has been no such thorough prospecting as is the case with the quartz districts in the Sierra Nevada counties. In the Salmon river country the surface is steep, generally brush and timber covered, and the surface rock so broken up that the discovery of a quartz ledge in place as a rule requires stripping and trenching, following float and panning tests. The last are not easily made, owing to the scarcity of water. Such discoveries as have been made during the last few years have been the result of a systematic search, often on ground supposedly well known and over which hundreds of miners have passed, making more or less superficial examinations. A persistence in systematic prospecting is sure to result in the development of more valuable properties. For this, Sawyer's Bar is the best center of operations. Eddy's Gulch, White Gulch and the head of the North Fork of the Salmon north of Tanner's Peak, particularly the two last, are localities justifying, on the prospects already obtained, an investigation extending over years and involving considerable expenditures. From White's Gulch and the head of the North Fork of the Salmon the large amounts of gold mined out of the bars and benches of the North Fork above Sawyer's Bar must originally have come. There are no blue leads or old channels to feed these deposits. As a fact, however, the ledges from which the gold came, excepting a few discoveries in White's Gulch, have not been found. They are certainly worth hunting for. As a whole, the record of the quartz mines of the Salmon river country has been good. Profitable mining has been the rule. In Knownothing creek district all the discoveries have been made since 1886. The Hansen mine, the Knownothing, and the Gold Run group, the only mines worked, have all been profitable properties. The only one of these mined extensively, the Gold Run, has made a steady improvement with depth. Starting at the surface a narrow chute of ore in a ledge that hardly seemed in place, the chute has steadily lengthened from 20 feet till at a depth of 500 feet it is 150 feet. With increased depth, spurs and parallel veins have been cut in the working tunnels, each rivaling in extent and richness the original pay chute. With a yield to date close up to \$150,000, there is at the present time more than that sum in sight in the mine. The average yield of the ore milled for two years past has been over \$50 a ton. The Hansen mine is another almost equally promising property. Mined down to the water level through tunnels, considerable high-grade ore has been taken out. The extent of the development warrants a hoisting and pumping plant capable of opening the mine to a considerable depth. There is reason to anticipate the development of much larger ore bodies with depth. In the vicinity of these mines and in the country extending southwesterly toward the New

river district in Trinity county there is an opening for prospectors. It is probable that a systematic exploration would develop a number of valuable mines.

Black Bear district, at the head of Black Bear creek and including Eddy's gulch, is the oldest and best developed quartz locality in the Salmon river country. The Black Bear mine has a record of yield of over a million and three-quarters to its credit, and is a promising mine to-day. New ground has been discovered above the tunnel level, and is being developed for working on a large scale. Other mines—the Klamath, Gold Ball, Fagundez and Uncle Sam have all been profitable properties, though at times having their period of depression when they didn't pay. It is, however, a conspicuous fact that in the long run all of the mines show a considerable profit balance. It is this feature which should encourage investment of capital and extended prospecting. For only the last two years has there been a wagon road into this country. Its isolation and lack of communication have operated to retard its development, even though it had a conspicuous advertisement in the Black Bear mine. None of the mining or milling plants are of approved modern construction, and the cost of operation has been higher and the percentage of the gold in the ore obtained smaller than should be the case. The construction of the road makes it possible now to bring in heavy machinery at a moderate cost, comparatively, and to do cheaper and better work.

Theories About Formation of Gold Nuggets.

By George Attwood, F. G. S., Assoc. Inst. C. E., M. Am. Inst. M. E.

Recent articles in these columns regarding the formation of gold nuggets, do they grow and how they grow, etc., have elicited some discussion. The following article has been furnished as a contribution to the current topic:

In the State of Guyana, Venezuela, South America, a large area of alluvial soil has lately been found to contain gold in paying quantities, and nuggets of 25 ounces in weight have been discovered within three feet of the surface.

The gold deposits are situated in a district called La Pastora, and in about latitude 7° 25' N. and longitude 62° 10' W. Numerous quartz veins are found in the neighboring hills, all of which contain more or less gold. The soil is dug up, carried on donkeys to the nearest supply of water, and then washed by the miners in a wooden bowl called a "batea."

The coarse gold is easily saved; the fine is separated in the form of an amalgam by the previous addition of a little mercury in the "batea."

Upon personal examination I found that fully one-half of the gold nuggets which were produced in this district were covered with a dark-brown substance resembling a silicate of iron. I also found it customary among the miners to beat the nuggets on a blacksmith's anvil (or with two hammers) to clean them before selling to the local merchants. A nugget which had not been hammered was selected by myself, and, after examination, it afforded the following results:

Weight.....75.00 grains
 Weight after fusion with borax.....65.56 grains

Loss in melting=12.58 per cent..... 9.44 grains

The nugget was in places covered with earthy matter, which would account for the loss in melting. The fused nugget was now assayed and gave:

Gold.....931.4
 Silver.....068.4

Total.....999.8

A nugget nearly covered with glazed ferruginous earth was now examined:

Weight before treatment.....304.70 grains
 Weight after treatment with HCl and NaO.....284.33 grains

The nugget, after being attacked with HCl, the following ingredients were found soluble:

Silica.....0.12 grains
 Fe₂O₃.....8.88 "
 CaO.....0.15 "
 MgO.....0.08 "

Total.....9.23 grains

The nugget was then treated with NaO, and afterward with HCl, and the following ingredients were found in solution:

Silica.....4.66 grains
 Fe₂O₃.....4.60 "
 CaO.....0.21 "
 MgO.....

Total.....9.47 grains

The gangue on the surface of the nugget weighed 20.37 grains, and 18.70 grains were accounted for in the treatment by HCl and NaO, leaving a loss of 1.67 grains. The loss is probably owing to the presence of hydrated oxides of iron.

After the nugget was boiled in HCl a quantity of fine flour gold, resembling freshly precipitated gold, was found

and collected. Having every appearance of being pure, it was carefully tested; but it was found to contain silver similar to the solid portion of the nugget. A large portion of the nugget's surface, after treatment with HCl and NaO, presented a peculiar appearance, and was found to be partly covered with a coating of fine gold of a dull color, and which, upon scratching or shaking violently, became detached from the more solid mass.

A portion of the cleaned nugget was fused with borax—

Weight.....	93.14 grains before fusion.
.....	92.50 " " after " "

Loss.....00.64 grains; = 0.68 per cent.

It was then assayed and found to contain—

Gold.....	945.4
Silver.....	654.4

Total.....999.8

As a comparative test of the difference in the composition of the gold obtained from the quartz veins and that found in the alluvial soil, a small quantity of gold amalgam was obtained from the Potosi Mining Company's crushing mill, and it contained as follows:

Mercury.....	55.55 per cent.
Copper.....	1.79 " " = 4.03 per cent in retorted gold.
Silver.....	3.57 " " = 8.62 " " " "
Iron (trace)...	
Gold.....	39.08 " " = 879.40 " " " "

In the analysis of the amalgam, the fineness of the gold appears less than it is when shipped for market, as the amalgam undergoes a cleaning treatment before melting; also in the fusion the gold is again purified, so that the average assays of a large quantity of gold have shipped from this district has ranged from 910 to 925 in fineness. The gold obtained from working the quartz veins is always of a baser character than that obtained from alluvial washings.

In conclusion: From the above experiments, made and recorded on a gold nugget covered with a glazed ferruginous earth, it would appear to me to prove that gold nuggets do gradually increase in size, owing to the accumulation of fresh particles of finely precipitated gold.

General News Notes.

The late W. T. Coleman left a \$425,000 estate.

The Midwinter Fair closes four weeks from to-day.

The Smuggler, at Aspen, Colo., is reported to be earning \$50,000 monthly.

C. P. HUNTINGTON has purchased a controlling interest in the Piedras Negras coal mines in Coahuila.

COLONEL R. S. BAKER, a California pioneer, after whom the town of Bakersfield was named, died at Los Angeles on Saturday at the age of sixty-nine years.

The Holden chlorination plant at Cripple Creek is reported to be successfully treating the ores of that district. The plant is handling 20 tons of ore per day at a cost to the miner of \$12 per ton.

GEN. JOHN HEWSTON, a well-known Californian, is arrested in London, charged with killing one of a party of musicians who molested him on the road. Hewston struck him with his umbrella, with fatal effect.

From January 1st to May 1st the specie imports into San Francisco by water amounted to \$1,063,159, about one-third being gold. Of the aggregate, about one-half came from Mexico, one-fourth from Australia, the remainder from British Columbia, Central and South America.

TREASURER E. E. STARR paid \$6,840,000 to 24,300 Cherokee Indians at Tahlequah this week, the proceeds of the sale of the Cherokee Strip to the United States. Every Cherokee Indian has bought a Winchester rifle and two or three revolvers, and there is promised considerable hilarity on the back seats.

The New York and Chance mine of Creede has shipped 50 tons of ore to the Ontario mill, Park City, Utah, to be treated by the amalgamation process. If the experiment proves successful, says *Ores and Metals*, the New York and Chance Company will put up a \$100,000 plant at Creede with a capacity of 50 tons per day.

ENGLISH and American statesmen are giving England instructions as to her duty and best policy in the present silver crisis. India and the Argentine Government are doing the same thing in a more direct way. The first necessity appears to be to acknowledge a mistake was made. Till such acknowledgment the matter must stand as it is.

NORTHERN FLOODS are wreaking havoc. In British Columbia the entire Fraser River valley is inundated. In northwestern Washington, floods have swept everything, the town of Concomully being entirely washed away. Much damage is also reported on the upper and middle Columbia. The rivers have all attained the highest point in memory.

CRIPPLE CREEK, Colo., and vicinity is on a war footing. The striking miners have fortified themselves, placed dynamite in several mines and works and declared defiance. The mine-owners decline to yield, and all efforts at arbitration are futile. About 2000 men hold the mines against their owners, and Gov. Waite, weak and wobbly, while supposed to favor the strikers, is trying to turn events to popularize himself.

Personal.

PROF. N. S. KEITH is now in Chester, England, and is reported successful in introducing electric machinery in English mines.

JAS. PENNEROAST died in this city last Sunday. He was a resident of California for thirty years, and was one of the founders of the Etna Iron Works.

General Mining Notes.

THE Hillside, Arizona, gold mine, formerly a great producer, is being reopened.

THE Elkon Mining Co. of Colorado recently paid a dividend of one cent per share, amounting to \$5000.

THE Homestake Mining Co. of South Dakota paid a dividend of 15 cents per share, or \$18,750, last week.

THE Copper Queen Mining Co. of Arizona has paid a dividend of 25 cents per share, amounting to \$500,000.

PRESIDENT CLEVELAND is reported to have bought a one-half interest in the Caledonia mine at Cripple Creek, Col.

THIRTY-SIX bars of silver bullion, 99 per cent fine and weighing 80 pounds each, were shipped from Butte, Montana, for Europe this week.

HENRY CAMPBELL and John Gilderslave, at work in a placer mine on Cave creek, Oregon, were killed on the 25th ult., by rocks falling on them.

THE quicksilver mines on the Hassayampa, below Wickenburg, Arizona, is being developed by the owners. Kansas City capital is interested in the enterprise.

THE *Transcript* says that W. F. Derham, who won the first prize in the single-hand drilling match at San Francisco Tuesday, is a resident of Nevada City.

THE Ella Heelan Gold Mining Company have a franchise to mine under the streets and alleys of Cripple Creek, Col., as soon as existing labor troubles are over in that lively locality.

According to the London *Mining Journal* of May 12th, the total yield of gold for the month of March, 1894, in the Witwatersrand, South Africa, district was 165,372 ounces, valued at \$569,295.

H. H. ST. JOHN, of Spokane, Wash., has sold his one-third interest in the Idaho mine, Slocan district, to N. D. Moore, a Duluth capitalist, for \$17,000. This is at the rate of \$51,000 for the entire property.

SUPERINTENDENT BROCKINGTON tells the Grass Valley *Union* that the Orleans Company will start at once to erect a new five-stamp mill. A contract was awarded McPhear & Co. to sink the shaft sixty feet.

THE Lincoln Gold Mining and Milling Co. of Placer county has incorporated. Directors—Fred C. Crosby, George S. Williamson, William K. Flint, S. B. Moore and F. H. Hansman. Capital stock, \$500,000.

THE *Record* says a company made up of Denver men is investigating a proposition to build a stamp mill of 100 stamps and a concentrating process with it, to work the ores of Gilpin and Clear Creek counties.

FROM Boise, Idaho, come reports of an excitement over alleged rich placer diggings in the southern part of Idaho county. Men are reported to be taking out \$100 a day with a rocker, but the report lacks verification.

THE Sierra Buttes Gold Mining Co., and the Plumas Eureka, owning the two mines named in Plumas county, at a recent meeting in London declared a dividend of 12 cents a share on the former and 18 cents on the latter.

THE Wahsatch, Utah, *Wave* says there is considerable excitement over the discovery of gold in Deer Creek canyon, lying just at the head of Provo canyon and to the west of it. Assays have been had ranging from \$7.22 to \$12 per ton in gold.

It is reported that a Denver syndicate has offered Mr. Thomas Lowthian \$400,000 for his Lone Star mine at Cochiti. As there is about four times this much ore in sight on the claim, the offer was refused, of course, says the *Santa Fe New Mexican*.

THE California Gold Mining and Investment Co. has filed articles of incorporation in Plumas county. Its principal office is at Helena, Montana. The capital stock is \$1,000,000. The idea is to work the "Taylor Diggins," near Genesee valley, Plumas county.

A CORRESPONDENT writing from Champie's camp to the Phoenix, Arizona, *Gazette* says that a good custom mill, equipped with concentrators, would pay handsomely at that place. At present the ores of the district are reduced by the tedious process of arrastras.

THE new converter plant at the Anaconda plant in Montana is in operation. It has a working capacity of 10,000,000 pounds of pure copper per month. It is built entirely of iron, extending 380 feet long and 124 feet wide, containing 24 converters and giving employment to 124 men.

THE Grass Valley *Tidings* says a new air compressor is now on the way for the W. Y. O. D. mine, and Superintendent Weissbein expects to have it running inside of three weeks. Five drilling machines are to be placed in the mine, and will be used in sinking the shaft and in running drifts.

THE Copper Queen mine, says a Bisbee (Ariz.) correspondent, is the largest producer in the world of like ore, and there is enough copper in sight, without further investigation, to keep 600 men busy for 12 years longer. They have the adjacent mountains prospected and have found them laden with precious metal. Here are 22 nationalities, 15 different religious beliefs.

By a recent cave-in at the bluffs at Tacoma, Wash., Major W. T. Gillespie, a well-known Utah mining man, and Arnold Barrenberg, an engineer, were killed and two workmen injured. Gillespie was superintending the slicing down of a section of the bluffs, where the hydraulic pump was in use, when the accident occurred.

JOE. ROUSE, who recently died at Lovelock, Nevada, at the age of 74, was a celebrated character in the early days of Nevada when "feet" in mining claims were a legal tender. About the time that "feet" were demonetized he was amalgamator in the Pioneer mill, the first quartz mill in Nevada east of the Comstock. He was an old-time prospector and had extensive acquaintance all over the coast.

In accord with a similar decision by the Supreme Court of this State several years ago, the United States Supreme Court has decided that no railroad company can claim in its land grant any tract containing mineral. The Northern Pacific Railroad Co. claimed a tract within the limits of its Government grant on which gold had been discovered, and the Su-

preme Court declares that the miner can secure title for such tract from the Government direct, and that the railroad company has no claim in the matter.

THE new Elk Creek district, on the South Platte, 40 miles from Denver, is reported to have shipped a ton of ore to Denver which is currently reported to have yielded over \$170 per ton in gold. The ore is an iron and copper pyrites. The veins are found in granite. The deepest hole in camp is only 20 feet.

DURING last April the United States produced 27,046,296 pounds of copper, being 4,152,462 pounds more than this country's quota under the tacit international agreement. During the same time foreign mines produced 16,542,400 pounds, 664,280 pounds in excess of their allotment. Decreased exports from this country are viewed as an evidence of increased home consumption, and consequent higher prices.

MICHAEL GILMORE was killed near Butte, Montana, by Andrew Erichs in a dispute over a mining claim last Saturday. Gilmore, during Erichs' absence, jumped a valuable placer mining claim belonging to Erichs. Erichs returned and demanded possession. Gilmore refused and opened fire, but missed, and Erichs emptied the contents of a double-barreled shotgun into Gilmore, killing him instantly.

BUT little is at present being done in the matter of applications to the Debris Commission for permits for hydraulic mining under the provisions of the Caminetti law. Two applications—one from the Concordia, the other from the Northern Placer in Plumas county—have been received during the last two weeks. Later in the year there will probably be more activity in that direction. Permits have been issued to the owners of the Excelsior, Craycroft Hill and Eureka near Downieville, making a total of forty-one since its organization.

FERNAND FARMHALLS has sued the estate of John Roach for \$50,651.72. The suit is based on the sale by Roach of plaintiff's one-quarter interest in the Abbott quicksilver mine in Lake county. The sale was made in 1876 and Farmhalls then received \$1870, which amount he was told by Roach was all that had been received. He now alleges that Roach in fact received \$22,000, all of which he fraudulently appropriated to his own use, except the \$1870, for which he accounted to his principal. Farmhalls' present claim is for the balance due, with interest from March 8, 1874.

FOUR men have arrived at Revelstoke from French creek, in the upper Big Bend. George Laforme brought \$2100 in coarse gold and nuggets from the Consolation mine, of which he is one of the four owners. This represents four week's work for four men. The mine has turned out on an average \$1000 a month for the past ten months. The bag weighed over ten pounds, and with some gold added, which brought the amount to \$2550, and weighing over eleven pounds, was sealed and sent to this city for sale, the banks here giving 50 cents an ounce more than can be obtained in British Columbia.

R. H. BLIVEN of Loomis, Wash., claims to have perfected a gold-saving device that is cheap and satisfactory in cases of refractory ores. He naturally declines to name his compounds, but gives the method in general as, "A lixiviation or leaching process, in which a chemical solution having energetic solvent powers for gold, iron or copper, but rendering lead, antimony and silver insoluble, is leached through the fine ore pulp in tanks. After settling, the clear solution is drawn off and the gold precipitated by a simple and cheap precipitant that throws down only the gold, separating it from the other metals."

THE Arizona *Journal-Miners* says: The financial troubles of the Henrietta Mining Company still remain unsettled. They are said to have been caused through an agreement to apply 50 per cent of all the bullion taken out on the payment of the mine, and there is scarcely a mine in the world that would permit of 50 per cent of its gross receipts being taken out and then have sufficient left to pay for mining and milling the ore and for development work in the mine. The employees of the mine are said to be in possession of the last cleanup of bullion, amounting to \$2000 or less, which they are holding until they receive their pay for work.

AT the Ontario mine, Park City, Utah, says the *Record*, the amalgamating plant is used for the treatment of silver ores carrying 50 ounces per ton or less. The highest grade ores are sent to the smelters. The cost ranges from \$2 to \$4 per ton, and from 85 to 95 per cent of the assay value is saved. At the Daly mine, in the same camp, the Russell leaching process is used. This claims to get even better results than amalgamation and at lower cost. Be this as it may, the Ontario mill is one of the best in the country. Its success is to be tried on the Creede low-grade silver ores, and if found successful will revolutionize the present method of treating this product.

S. R. COX, who was at work at the Winder mine, located 12 miles from Barstow, fell down the shaft on the 20th ult., catching on the projecting timbers which knocked him senseless. C. C. Kehr, who was working with him, lowered him to the ground and went for help. In his absence Cox came to and started to climb up the ladder. His strength gave way and he fell again, crushing his right cheek bone and tearing off his eyelid, which was found on the projecting timbers. Cox started up the ladder a second time, and was found dead about 25 feet from the bottom, clinging to the rounds of the ladder. Cox was about 55 years of age, and had been in the district only a few days.

ON Thursday the vote on the best county mineral exhibit at the Midwinter Fair stood as follows: Nevada 388,096, El Dorado 260,208, Placer 95,699, Amador 68,452, Tuolumne 33,458, Calaveras 22,141, Plumas 16,875, Trinity 15,029, Sonoma 15,013, Shasta 8385, Butte 7193, Sierra 5382, San Benito 5313, Tulare 4386, Santa Cruz 4226, Santa Clara 3899, Alameda 3712, Mariposa 2999, Mono 2774, Lake 2637, Napa 2615, Kern 2042, Fresno 1978, Siskiyou 1690, Santa Barbara 1651, Riverside 1546, Kings 1528, Ventura 1461, San Bernardino 1439, San Mateo 1376, Sacramento 1125, Los Angeles 1118, San Joaquin 1013, San Luis Obispo 923, Alpine 926, Humboldt 844, Yuba 805, Tehama 744, Solano 527, San Diego 463, Modoc 419, Inyo 285, Del Norte 264, San Francisco 202, Colusa 176, Lassen 116, Contra Costa 116, Marin 78, Sutter 66, Merced 65, Orange 60, Monterey 58, Glenn 44, Madera 41, Mendocino 20, Yolo 18, Stanislaus 16. The vote determines nothing beyond the "rustling" ability of the friends of the various county exhibits and cannot be cited as proof *per se* of the merit of any particular exhibit.

Loss of Gold in Milling Ore.

TO THE EDITOR:—I have just been reading a letter under the above heading by Mr. G. F. Deetken in your issue of the 19th inst. Like a good Californian he incidentally attacks the Gilpin county (Colorado), milling practice and quotes Mr. Argall in support of his condemnation of methods so unlike those of California. Mr. Argall said that "the saving by amalgamation does not exceed 60 per cent on average ores." Mr. Deetken quotes him as having noted "a present loss of 40 per cent in milling in Gilpin county." A loss of 40 per cent "in milling" is very different from an equal loss "in amalgamation," for to the saving by amalgamation must be added the saving by concentration before you can figure out the saving or the loss by "milling." Concentration forms a very important feature of the Gilpin county method as in use to-day.

As the result of many years' experience of the work done at Black Hawk, I would consider Mr. Argall's estimate hardly fair. At any large, well-managed mill, supplied with the output of any particular mine, it is found that about as much gold is obtained in the mill as the fire assay shows. Now, the mill gold is about 760 to 780 fine, therefore the saving by amalgamation is close to 76 or 78 per cent.

At the custom mills and in the treatment of small lots of ore the results are not so good because the best conditions for successful work are not determined until the ore has been all or nearly all passed through the mill.

Mr. Argall says that his "experience is but that of an occasional customer of the mill." This fact may explain the difference in the estimates which we have formed.

T. A. RICKARD.

Denver, Col., May 23, '94.

A New Placer Machine.

A Denver, Colorado, mechanic has devised a new gold-saving device whereby he claims he can do, with currents of air and motion, what water and motion will do in a pan or sluice. The machine is a box, suspended at any desired angle in a frame, having a rapid side motion or shake. At the upper end of the box is a hopper, over which a screen is placed of any desired mesh. This screen has an outlet or spout. All dirt is thrown or deposited upon this screen. From the hopper beneath, the dirt is dropped or fed upon a rapidly-revolving spiked wheel. This wheel pulverizes and disintegrates the dirt. In front of this wheel is a stationary breaker, through and against which the dirt is thrown or driven. By these appliances the dirt is thoroughly broken and pulverized. The dirt then passes across an air chamber attached to the bottom of the box. Over the air chamber is a fine screen. A number of riffles are attached to this screen. Air is driven into the air chamber from a blower beneath.

The air, passing through the fine screen under the riffles and coming in contact with the dirt, combined with the rapid side motion, not only carries the dirt over the riffles, but causes the gold to be sifted to the bottom and retained in the riffles. Fans are attached to the spiked wheel beneath the hopper. The current of air created by these fans, passing down through the box, comes in contact with the current of air from beneath the box, in a hood or cover lined with carpet.

The hood has a returning and retaining board, to which a riffle is attached. This combination hood lined with carpet, is for the purpose of catching and retaining all microscopic gold. Below the air chamber, amalgamated plates and riffles are attached to the bottom of the box.

The device is known as the Gold King dry placer machine, being handled by a company of like name. They claim to be able to save from 90 to 100 per cent of gold values, from all kinds of sand, gravel, dried clay and reasonably moist dirt. These facts, they say, have been demonstrated by practical tests in the field.

British Columbia Gold.

The Fraser river excitement of 1857 is still remembered by some old Californians. The yield of gold in this State had begun to fall off, and many thought the mines would soon be exhausted. Reports of valuable discoveries along the Fraser river in British Columbia were received, and there was a general rush for the new diggings. Much San Francisco property was sold at very low prices by those who wished to try their luck at the north, and every berth in the steamers was taken for some weeks. Many of these adventurers were glad to beat their way back to California in a dilapidated condition, sadder and wiser. The event brought British Columbia into notice as a gold producer, and from that day to this some gold has been annually secured from her mines. The product for 1858 was \$520,357. In the following year it was \$1,615,000. For the next four years the annual average was \$2,285,200. In 1864,

the yield was \$3,735,851, the largest in the history of that district. The product has since steadily declined, though it was maintained at upwards of \$1,000,000 per annum to the close of 1881. For the next eight years it was from \$954,000 to \$588,800, and for the past four years from \$949,400 to \$379,500. From 1858 to 1893 inclusive the yield was \$53,892,997.—Bulletin.

As Explained by M. Josephson.

M. Josephson, who recently came hither from Cripple Creek, gives an account of the origin of the trouble to the *Report* as follows:

"When silver became demoralized," said Mr. Josephson, "a lot of silver miners were thrown out of employment, and they descended on Cripple Creek looking for work. The result was that the gold miners were thrown out of employment because the silver miners would work for less money than the gold miners would. The gold miners struck, but you heard very little about it because it was suppressed as news. That was last January. The gold miners soon saw they were not in it and they did not make much of a fight. They surrendered and got out and went to other places.

"Then the silver men had it all their own way for a while, till some economical mine owner thought of coal miners. He got others to join him, and as a result a lot of coal miners were imported to Cripple Creek from Trinidad and other places in southern Colorado and New Mexico. The coal miners would work for less than the silver miners and that is the key to the whole fight. The silver miners were notified they must accept coal miners' pay or lose their jobs, and they struck and there you are."

"But this matter of pay, Mr. Josephson—what does it amount to?"

"Well, the gold miners got about \$4.50 a day and every one was content. Silver miners get about \$3.50 a day and they cut the gold miners' throats to that extent when they went to Cripple Creek. For a time everything went along bloomingly at that rate, but when coal miners were introduced wages went still lower. Coal miners work at \$2.50 to \$2.75 a day. So you see the difference, and you see what the silver men are fighting about."

Smelter for the Needles.

There is no doubt that a smelter will be established at The Needles, according to General Manager Cahel, in an interview with the editor of the *Winslow Mail*. The company has been incorporated under the laws of Arizona, plans and specifications have been prepared, a site selected near the old bridge across the Colorado river, and within a few weeks, when another meeting of the directors will be held, contracts will be ratified and steps taken to inaugurate the work of construction. The plans contemplate the building of two furnaces of 100 tons capacity daily, two roasters with brick stays 5x5 ft. and 80 ft. in height, together with sampling works, necessary elevators, etc. The plant will cost \$100,000 in round numbers, two-thirds of which has already been subscribed. For a month past an agent has been at work securing estimates as to the amount of ore on which a smelter could rely, and it is found that at least 100 tons daily could be counted on at the start, 79 of which will come from the Prescott Hills, Vanderbilt and other camps. By the establishment of the smelter the road will secure ten cars of freight a day. Shippers of ores between Prescott, Arizona, and Mojave, California, will be given a lower rate by from \$4 to \$7 per ton than shippers at other points who send their ores to Colorado.

Valuable Mineral Discovery.

Professor Von Peterdorf has returned from a trip to the Tejon country, during which he made quite an extensive investigation of that part of the country, says the *Bakersfield Californian*. Among other things he discovered a large ledge of marble which is of good quality and promises to become of great value when properly developed. He also found ledges yielding zinc, iron, lead, copper, molybdenum and best of all, gold. The latter runs about \$50 to the ton. Out-croppings of coal of good quality have also been found by him at several points in the foothills.

The professor has just received a letter from the State University, whither he sent some of the large bones dug up some time ago by him and John Baker in the hills to the north of the Baker place. These bones, the University reports, are of some amphibious mammal of a species resembling the hippopotamus or tapir, and whose habitat was the shores of the great inland sea that once covered this valley. The animal was a vegetarian, and lived on the palms and other tropical growths which flourished here then—anywhere from ten thousand to ten million years ago. He was of immense size and was a fit companion for the stupendous animal growth of that period.

An Export Tax on Gold.

One of California's Congressmen is about to introduce a bill levying an export tax on gold in any form. His aim is to get the bill thoroughly discussed during the present session, but not to let it come to a vote. With the growth of popular opinion in favor of silver, he hopes either to pass the bill during the next session or use it as a strong lever in favor of monetizing silver.

"The idea of this movement," he says, "is simply to enable the United States to enjoy a part of the profits which England is getting from American securities owing to the debasement of silver. This country owes tremendous sums to British investors in the way of bonds. When the interest or principal on these is paid it must be handed over to the foreigners in gold.

"Gold here will buy no more than silver, but it goes a long way further than silver for the purposes of capitalists abroad. Of course there is no new information in that, but the purpose of my bill is to cause English profits to be expended here for commodities other than gold. Inasmuch as the former can be sent abroad without export duty while the English will have to pay us a heavy percentage on all the yellow metal they ship over the Atlantic, I believe that it only needs some firm action of this country in order to bring England around to a silver basis, and I propose to do what I can to bring such action to pass."

In support of the latter statement, he produced a copy of an editorial recently printed in the *London Financial News*, a portion of which reads as follows: "Senator Cameron points a plain moral when he remarks that if the United States would venture to cut herself adrift from Europe and take outright to silver, she would have all America and Asia at her back and would command the markets of both continents. The barrier of gold would be more fatal than any barrier of the Custom-house. The bond of silver would be stronger than any bond of free trade. There can be no doubt about it, that if the United States were to adopt a silver basis to-morrow British trade would be ruined before the year was out. Every American industry would be protected not only at home but in every other market.

"Of course, the United States would suffer to a certain extent through having to pay her obligations abroad in gold, but the loss on exchange under this head would be a mere drop in the bucket compared with the profits to be reaped from the markets of South America and Asia, to say nothing of Europe. The marvel is that the United States has not long ago seized the opportunity, and but for the belief that the way of England is necessarily the way to commercial success and prosperity, undoubtedly it would have been done long ago.

"Now, Americans are awakening to the fact that so long as they narrow their ambition to becoming larger than England they can't beat us. It has been a piece of luck for us that it has never before occurred to Americans to scoop us out of the world's markets by going on a silver basis, and it might serve us right if, irritated by the contemptuous apathy of our Government to the gravity of the silver problem, Americans retaliate by freezing out gold. It could easily be done.

"We propose shortly to show, by evidence collected from perfectly unprejudiced sources, that even now the process has begun, and is proceeding at a rate that will astonish most people, and probably make this country regret that it did not at an earlier stage fashion its monetary policy on principles of friendliness to other nations instead of on a basis of short-sighted selfishness."

Big Money in Ambergris.

Says the *Sydney Bulletin*: Apropos the whales disporting outside Sydney heads recently. Two years ago one of Macgregor's (Tasmania) whaling captains, having cut the blubber from a whale, was about to cast the rest of it adrift, when there came alongside two Hobart fishermen—"Portuguese Joe" and his mate, an African negro. The Portuguese begged to be given the carcass, so that they might tow it ashore and make what they could out of it. "All right," said the skipper, with the generosity of a satisfied exploiter who knew the blubber business to its omega. Joe, having got the leviathan's framework on the beach, began to search for ambergris, which drug was quoted at that time in the current price lists at somewhere about \$65 per ounce. He found 174 pounds. Many people interviewed him, and wanted to give him \$25,000 to \$45,000 for the lot; but the man understood the luck of his find.

Meanwhile the ambergris was lodged in a bank, which was presently served with an injunction, on behalf of the Macgregor firm, to restrain the sale of the precious prize, pending a discussion on the ownership. But these legal fireworks fizzled out, and the ambergris is still being realized in London, the two fishermen having already received several thousand pounds apiece.

The Mineral Hydrocarbons.

Their History, Geography, Geology, Physical and Chemical Properties and Uses.

NUMBER 1.

Written for the MINING AND SCIENTIFIC PRESS and copyrighted 1894 by Henry G. Hanks, F. G. S.

Petroleum is one of the few minerals, if not the only one within the observation of man, which exists in the three forms of nature—solid, liquid and gaseous.

In this history the mineral hydrocarbons will be divided into three groups, those which are solid at ordinary temperatures, those which are liquid and those which are gaseous.

Under the first heading will be included asphaltum, mineral coal and numerous combustible minerals resembling both. The second class will be maltha, petroleum and naphtha, and the third natural gas.

Natural gas, naphtha, petroleum, maltha and asphaltum were doubtless known to man before the birth of history. The earliest records that survive the destroying hand of time refer to these natural substances and their limited use.

The word asphaltum appears at least five times in the Bible under the name of pitch and slime. (Genesis 6-14; 11-13; and 14-16. Exodus 2-3; and Isaiah 34-9).

Moses, the first known historian, describes in the first books of the Bible the deluge and the building of Noah's ark. "Make thee an ark of gopher wood; rooms shalt thou make in the ark and shalt pitch it within and without with pitch. * * * And when she could no longer hide it, she took for him an ark of bulrushes and daubed it with slime and pitch."

Asphaltum is also frequently mentioned by other ancient writers.

The cuneiform inscriptions of the East were known to moderns long before they could be deciphered. In 1842 certain mounds near the town of Mosul in Mesopotamia, Asiatic Turkey, opposite the ancient site of Nineveh, were opened and a multitude of baked clay tablets, some much broken, were found. These were sent mostly to the British museum, where they were studied and finally translated. It was then known that a similar account of the deluge was impressed on some of these tablets, and it was inferred that Moses and the unknown Assyrian or Chaldean historian had related the same story in similar words, presumably derived from a common source, and that the tablets possibly antedated the books of Genesis and Exodus.

The Babylonians and Assyrians were civilized nations something like 2000 years before the Christian era. It is now believed that in the Royal library at Nineveh there were 10,000 inscribed tablets on general literature and history.

On some of these tablets, bitumen is certainly several and perhaps many times mentioned. The following translation from the deluge tablets is given in "The Chaldean Account of Genesis" (George Smith, New York, 1870, fol. 266): "Three measures of bitumen I poured over the outside; three measures of bitumen I poured over the inside."

Berosus, a Chaldean historian who lived in the time of Alexander the Great, was no doubt familiar with the tablet literature of the period. He wrote a history of Babylonia and Chaldea, a portion of which is quoted by Alexander Polyhistor, a Greek historian, as follows:

"The ark was stranded in Armenia; some parts of it still remain in the Corycæan mountains and the people scrape off the bitumen with which it had been outwardly coated and make use of it by way of an alexipharmia and amulet."—(Cory's Ancient Fragments, fol. 63.) The author must have drawn heavily on his imagination, for Ararat is practically inaccessible, and it is not likely that "certain persons" would make frequent visits to the top of the mountain for any purpose.

Mount Ararat consists of two enormous conical masses of unequal height, rising from a plateau itself 300 feet above sea level; the highest summit rises to an elevation of 17,112 feet. In modern times a number of unsuccessful attempts were made to reach its summit before 1829, when it was climbed by Dr. Parrot, a German. Ascents have since been frequently made. The mountain is an extinct volcano.

Marco Polo (book 1, chapter 4), who visited China and the East in the 13th century, mentions this mountain in the following words: "In the central part of Armenia stands an exceedingly large and high mountain, upon which it is said the ark of Noah rested, and for this reason it is termed 'The Mountain of the Ark.' The circuit of its base cannot be compassed in less than two days. The ascent is impracticable on account of the snow toward the summit, which never melts but goes on increasing by each successive fall."

Theophrastus (History of Stones, chapter 24,) describes a stone believed by the translator to have been indurated asphaltum. "That also which is called 'spinus' is found

in the mines. This stone, cut to pieces and thrown together in a heap exposed to the sun, burns, and the more so if it be moistened or sprinkled with water." There is but little reason to believe that the author has described any form of bitumen. The described properties are those of lignite, which it probably was.

The following may be found in the writings of Pliny (Natural History, book 35, chapter 51).

"Nearly approaching the nature of sulphur is that of bitumen, which in some places assumes the form of a slime and in others that of an earth—a slime thrown up, as already stated, by a lake in Judea and an earth found in the vicinity of Sidon, a maritime town in Syria. In both these states it admits of being thickened and condensed. There is also a liquid bitumen, that of Zacynthus (the island of Zante) for instance, and the bitumen that is imported from Babylon, which last kind is also white. The bitumen, too, of Apollonia is liquid. All these kinds in Greek have the general name of 'pisasphaltos,' from their strong resemblance to a compound of pitch and bitumen. * * * Bitumen to be of good quality should be extremely brilliant, heavy and massive; it should also be moderately smooth, it being very much the practice to adulterate it with pitch. * * * It has already been stated that bitumen was formerly employed for staining copper and coating statues. * * * It has been, too, used as a substitute for lime. At the smithies they are in the habit of varnishing iron and the heads of nails with it, and of using it for many other purposes as well."

Diodorus Siculus (Book 4, Chap. 1) informs us that "among the Agyreans something remarkable happened concerning Hercules. Not far from the city, in a rocky way, the oxen made impressions with their feet, as if it had been in wax; and the same thing happening to Hercules, he thought his immortality was in part sealed to him." It can scarcely be doubted that these impressions were made in asphaltum, from which circumstance the myth may have originated, for the same thing is frequent on the asphaltum pavements of cities laid by unskillful workmen, and in California localities where soft asphaltum crops out on the surface of the earth.

Asphaltum was largely used in the building of Babylon, and the mention of this fact is of frequent occurrence in ancient writings.

Herodotus (Clio 179) thus describes the laying of brick in that ancient city: "Eight days' journey from Babylon stands another city called 'Is.' It is on a small river of the same name which discharges its stream into the Euphrates. Now this river brings down with its waters many lumps of bitumen from which the bitumen used in the wall of Babylon was brought. * * * As they dug the moat, they made bricks of the earth that was taken out; and when they had molded a sufficient number, they baked them in kilns, and then making use of hot asphalt for cement and laying wattled reeds between the 30 bottom courses of bricks, they first built the sides of the moat and afterward the wall itself in this manner."

Strabo (Book 16, chap. 1) in writing of the hanging gardens of Babylon, informs us that "the pillars, the walls and the terraces are constructed of baked brick and asphalt. * * * On account of the scarcity of timber (at Selencia), the beams and pillars of the houses were made of palm wood. They wove ropes of twisted reeds round the pillars, painted them over with colors and draw designs upon them. They cover the doors with a coat of asphalt. * * * The walls were of brick cemented with brimstone (asphaltum). * * * In the middle of the city she (Semiramis) built a temple to Jnpiter which the Babylonians call Belus, of which, since, writers differ among themselves, and the work is now wholly decayed through the length of time. There is nothing that can be certainly related concerning it, yet it is apparent that it was an exceeding great height, and that by the advantage of it the Chaldean astrologers exactly observed the rising of the stars. The whole was built of brick cemented with asphalt with great art and cost. * * * There are many remarkable and wonderful things to be seen in Babylon; but among these the great quantity of asphalt that flows out of the ground is not to be the least admired, which is so much that it not only supplied all their occasions in building such great and mighty works, but the common people gather it profusely, and when it is dry, burn it instead of fuel. And though it be drawn out by an innumeral company of people, yet it is as plentiful as ever it was before." (Book 2, chap. 27).

"Semiramis sunk in the low grounds of Babylon a place for a pond, four square; each square was 300 furlongs (nearly 40 miles) in length lined with brick cemented with brimstone, and the whole 35 feet deep. Into this having first turned the river, she made a passage in the nature of a vault from one palace to another, whose arches were made of firm and strong brick and plastered all over on both sides with bitumen, four cubits thick. * * * The

river was turned into its ancient channel again so that it flowed over the whole work. Semiramis could go from one palace to the other without passing over the river." (Book 2, chap. 1).

Diodorus Siculus, describing the building of Babylon by Semiramis, frequently mentions asphaltum being used very largely in the construction of walls and buildings.

Describing the hanging gardens, he thus mentions the use of asphaltum: "Over the several stories of the fabric were laid beams and summers of huge massy stones, each 16 feet long and 4 broad. The roof over these was covered with reeds daubed with an abundance of brimstone (asphaltum). Then upon them were laid double tiles pargeted together with a hard and durable mortar and over them all was a covering of sheet lead, that the wet that drenched through the earth might not rot the foundation."

"Alexander, marching toward Babylon through the country lying between the rivers Tigris and Euphrates, came to a city called Memmlum, where there is a fountain within a cave that belched out a quantity of pitch (asphaltum), so that it appears that the Babylonians had their cement from thence, which they employed about the making of their walls of an incredible breadth and compass."

Quintus Curtius Rufus (Life and Death of Alexander the Great, English translation, London, 1861, folio 100): "The beauty and pleasantness of that city (Babylon) gave just occasion to Alexander and such as were with him to admire it much. Semiramis was the builder thereof, or, as some affirm, Belus, whose palace is to be seen there. The walls are made with brick interlined with pitch. They be two and thirty foot in breadth, so that two carts may easily go upon them in front. * * * The river of Euphrates doth run through the midst of the city and is kept in on all sides with walls of wonderful workmanship. But the great channels, made of brick and fastened with pitch instead of mortar and wrought low within the ground to receive the violence of the stream, do exceed all the rest of the works there made, for, except the same were of quantity and largeness to receive the water when the stream floweth over the banks that be made to keep it in, the violence thereof would beat down the houses of the city."

Vitruvius (Architecture, Book 8, Chap. 3) refers to the "vast lake at Babylon called the asphaltic pool. * * *

In the island of Zacynthus (Zante) and about Dyrrachium and Apollonia are springs which throw up a great quantity of pitch with the water," * * * "contains floating bitumen with which, and with bricks of baked earth, Semiramis built the wall around Babylon. At Jopa, also in Syria, and in Numidian Arabia are lakes of immense size yielding large masses of bitumen, which is taken away by the inhabitants of the neighborhood; this is not, however, surprising, for at that spot there are many quarries of hard bitumen, hence when the water bursts out from this bituminous earth it carries it herewith, and, having come forth, the bitumen is separated from it and deposited." The Dead sea in Syria is a noted ancient locality of asphaltum. It is frequently mentioned by writers, both sacred and profane.

This remarkable sheet of water, which in many ways resembles lakes Mono and Owens in California, lies 1208 feet below the level of the ocean, and the climatic conditions are such that it is difficult for human life to exist there. For this reason, no thorough exploration has been made of it in modern times, and we must trust to ancient history and the reports of a few superficial modern surveys for all we can know of the geology of this region and, for that matter, the geography also. If it were possible to make as perfect an exploration as has been made of Death valley in California, there is reason to believe that deposits of asphaltum would be found equal perhaps in extent to any now known in the world. Information gained from sources mentioned would seem to warrant such an opinion.

(To be continued.)

A Doubtful Experiment.

The *Bulletin* says that Henry Spencer, a Colorado miner, is equipping a small naphtha launch for a novel prospecting venture on the Sacramento river above Redding. The launch is forty feet long and propelled with an eight-horse power engine. In the bow of the boat he has placed a peculiar pump, which was constructed from his own design.

The pump is calculated to suck up the mud from the bottom of the river and throw it on a sluice which runs the full length of the boat above the cabin, and extends far enough over the stern to throw all the refuse back into the river. It is claimed that the apparatus will work nearly a thousand cubic yards of mud a day.

Experiments of this character, says the Nevada City *Transcript*, have been tried at different periods in the past on several streams in this State and none have proved suc-

cessful. Large sums of money have been expended at different points on the Feather river, one company with a large boat being at work now a few miles below Oroville. This company has not yet found the gold, but they pumped, dredged and raised mud in quantities for some time and caught one large eel.

Gold, except of the very finest kind, will not stay in mud but sinks to the bottom and when found it will require unusual pressure to raise it by suction. Many times when gold is found in the bottom of a stream it requires to be dug out of the crevices with a sharp instrument to get it, and in some instances a knife and spoon are necessary.

The Allotropy of Gold.

The following is from the Transactions of the American Institute of Mining Engineers, and was read by Henry Louis, London, England, at the recent Virginia Beach meeting:

It can scarcely be considered a matter of doubt, in the present state of our knowledge, that the existence of, at any rate, two well-marked allotropic modifications of gold can be recognized, namely (a), the ordinary, yellow variety, and (b) the red, brown or purple, non-lustrous, amorphous variety.

There are, indeed, not wanting indications that still other allotropic forms may be capable of existing. It is, for instance, possible that the green colors of gold obtained under certain conditions, or that the black powder produced when the alloy of gold with potassium is decomposed by water, may represent further allotropic modifications, although this proposition is open to doubt. It can scarcely be pretended that the two first-named varieties have been absolutely isolated, yet it is, perhaps, quite permissible to speak of the ordinary and the amorphous modifications as having a proved existence.

Ordinary gold is sometimes found crystallized in nature, although never in a state of purity. When gold is melted and cooled slowly, its surface shows crystalline markings, and the fact that it is capable of crystallizing in the cubic system may be looked upon as established. When gold is produced by precipitation, the form which it assumes is dependent on the conditions of precipitation. G. Rose says that gold precipitated by ferrous sulphate from very dilute solutions is so finely divided that no regular form can be recognized, but in more concentrated solutions the precipitate consists of minute cubes. When oxalic acid is used as a precipitant, the gold is coarser and forms octahedral crystals. J. Thomsen has obtained similar results. Working with dilute and with highly dilute solutions, I have myself been quite unable to recognize any crystalline structure, even under the highest powers of the microscope; nor did there seem to be even any tendency of the particles to group themselves into arborescent forms, such as might indicate incipient crystallization. Precipitates from solutions containing between 0.0001 and 10 per cent of gold gave no indications of crystallization, even when magnified 800 diameters.

Thomsen has also pointed out that the physical characters of precipitated gold differ according as it has been precipitated from solutions of its chloride or its bromide. He also found that these different forms possessed different degrees of thermic energy, and hence deduced a strong argument in favor of their being allotropic varieties.

The specific gravities of various forms of gold differ considerably. G. Rose found that fused gold had a density of 19.3336 after it had been compressed in a coinage press, it being a little lower before this mechanical treatment. The density of precipitated gold thrown down by ferrous sulphate was found to vary from 19.5419 to 20.6882, the highest figures being obtained from extremely dilute solutions, the precipitate from which showed no trace of crystalline form; when precipitated by oxalic acid its specific gravity was 19.4791. When such amorphous gold was struck in the coinage press, its density became reduced to 18.0194. I have found that the density of gold left on dissolving out various metals alloyed with it, when the gold remains behind in a brown, amorphous, lusterless condition, varies between 20.3 and 19.5.

It is only fair to notice that Rose did not ascribe the differences in the densities of the different forms of gold to allotropism, but has suggested another explanation which is hardly, to my mind, a sufficient one. It is probably safe to assume that there are two modifications of gold—one a light one, of density 19.3 or thereabouts, and the other a heavy one, the density of which approaches 20.7—whilst various combinations of these extreme forms are capable of occurring.

In this connection the curious divergencies in the densities of specimens of native gold, from different localities but of about the same composition, may also be referred to; allotropism may, at any rate, be suggested as a possible explanation of them. There are thus sufficiently well-

marked differences in physical characteristics to support the hypothesis of allotropism.

As regards chemical properties, Thomsen has also pointed out that when amorphous, pulverulent gold is acted on by chlorine or bromine, auric compounds (Au_2Cl_4 or Au_2Br_4) are produced; whereas, these same substances produce auric compounds (AuCl_3 or AuBr_3) with ordinary gold.

I have found another point of difference, of far greater practical importance, in the behavior of these modifications toward mercury. Ordinary gold, of course, amalgamates readily, as is well known. I have found that gold precipitated from highly dilute solutions by ferrous sulphate is not attacked at all by mercury when freshly precipitated, and only slightly after drying on an air bath. Near the boiling point of mercury, partial amalgamation took place, but it was by no means complete. Mercury containing a large amount of sodium amalgam was equally without effect on the dry gold, although it readily and completely amalgamated it when moist. In these observations I seem to have been partially anticipated by Ludwig Knapp, who, however, appeared to attach little importance to his observations. In a brief note on the preparation of certain amalgams of gold, he says:

"Gold precipitated by green vitriol or mercurous nitrate is not suitable for amalgamation, as it is too finely divided and always floats on the surface of the mercury as a black powder, whether heated mercury be poured upon heated gold or vice versa. I examined this floating black powder and found it to contain gold and mercury. * * * Gold precipitated either by means of arsenious acid or by boiling a solution of the chloride in amyl alcohol, when it separates out in small, lustrous octahedra, is best suited for amalgamation."

It may also be added that the purple of Cassius, which probably contains an allotropic modification of gold, is not attacked by mercury. The black pulverulent form of gold, resulting from the decomposition of the potassium gold alloy amalgamates pretty readily, as does also the coherent pale brown powder produced by precipitating with sulphurous acid a strong solution of auric chloride.

All forms of gold are converted into the ordinary yellow, lustrous variety by the action of heat. A very high temperature is not required, but the exact point has not yet been determined; it is certainly well above 200°C ., but probably under 600°C . Powerful mechanical action, such as percussion, friction or compression, has the same effect.

I do not pretend that the above data form anything like a complete chain of evidence proving irrefragably the allotropism of gold, or that our knowledge of this subject is precise or definite; yet I venture to think that the facts do warrant us in looking upon the following deductions as probably correct:

1. Gold is capable of existing in allotropic modifications.

2. One of these modifications is capable of amalgamation only with great difficulty, if at all.

3. This modification is capable of being produced and of subsisting under conditions that may reasonably be supposed to exist in nature when gold is deposited in reefs.

Whatever may have been the nature of the solution by means of which gold has been introduced into the deposits in which we find it, whether as a soluble haloid salt, as is generally supposed, or as an alkaline aurate, as I venture to suggest, it may have been precipitated from such solution in various ways and under varying conditions. We have but few indications of the cause of this precipitation, but it is reasonable to conjecture that such reagents as ferrous sulphate or sulphurous acid, both resulting, perhaps, from the slow oxidation of iron pyrites, may have found their way, in solution, into the fissures within which the gold solution was circulating, and may thus have caused the deposition of gold within the reefs. Now, if the gold, thus deposited from highly dilute solutions, happened never to be exposed to a particularly high temperature, or to violent mechanical action, the conditions would be favorable to the production of that allotropic modification of gold which is indifferent to the action of mercury. In other words, under the above conditions, an auriferous deposit will have been produced in which a greater or smaller part, or perhaps even the whole, of the gold is what gold miners term "rusty." I have little doubt that the "rustiness" of gold is in different cases due to widely different causes—that, in fact, there is more than one kind of "rustiness;" but I venture to think, also, that there is sufficient evidence to warrant us in classing allotropism among

such causes of "rustiness." If this is correct, I need hardly point out either the great practical value or the application of this deduction. The gold which is thus allotropically indifferent to mercury is in a condition in which it is readily attacked by such reagents as chlorine and potassic cyanide. I have pointed out long ago that the gold of the Witwatersrand deposits of the Transvaal was probably deposited *in situ* under some conditions as I have sketched above, and it is now notorious that a large portion of the gold in them is not attacked by mercury, but readily by potassic cyanide solution. Again, in some cases it may be economically feasible to convert the non-amalgamable modification of gold into the common amalgamable variety by heating the ore to a moderate temperature, or the same end may be attained by mechanical means. In any case, the only really sound method of preventing losses of gold in the process of gold extraction is that of ascertaining, in the first place, the ultimate causes of such loss; and I venture to hope that it will be found that among such causes, the one here treated of—namely, allotropism of gold—will be found worthy of more consideration than it has hitherto received from scientific gold miners.

Indian Currency and the Far East.

The London Times says: "The China Association of Shanghai has addressed a long communication to the Government of India on the recent currency policy of the latter and its effect on the trade of the far East. Its propositions are summarized as follows: (1) As foreseen, the close of the mints in India was the primary direct cause of a heavy fall in the gold value of silver, and of creating an artificial difference in exchange between India and the far East to the extreme prejudice of the commerce between them. (2)



HOTEL RUBIO, MT. LOWE RAILWAY.

The difficulties surrounding British trade in the far East are increased by the uncertainties of further legislative action, especially in the matter of an import duty upon silver, which would have an immediate fresh disastrous influence upon the situation. (3) If British interests in the far East are recognized by the Indian Government and identified with their own it will be possible to unite on a silver basis, the adoption of which the Imperial Government will be unable to resist without exposing themselves to the accusation that for the benefit of certain capitalists, who alone at present derive benefit from the appreciation of gold and the disturbance of the world's system of exchanges, they have endangered the interests of the mercantile and industrial classes. (4) Persistence in such measures would have the utmost influence in inducing the Imperial Government to meet a conference of the nations concerned in the adjustment of the currency question, with a desire to secure an arrangement which shall restore the solvency of the Indian empire and place British trade on the sound foundation it occupied before the violation of the bimetallic ratio. (5) If, on the contrary, the Indian Government declines to regard the appeal of other British subjects in the far East, and persevere in expedients which cannot succeed, it is to be feared the Imperial Government will await the issue of events, and the prospect of international agreement will become remote. (6) To give effect to these representations there would seem to be no alternative to reopening the mints of India, and to have recourse to other methods of increasing the national revenue in order to compensate for losses caused by exchange. The letter concludes by an 'emphatic protest' against the imposition of an Indian duty of five per cent on all imports save gold and cotton goods, because of 'the damage and loss such action will inflict upon British interests in Great Britain, India and the far East.'

Mount Lowe Railway.

There are doubtless but few of our intelligent readers who have not heard somewhat of the Mount Lowe Railway. It is situated near to Los Angeles and Pasadena, and connects these two southern California cities with the majestic Sierra Madre range of mountains. This range has been called by the poetic people of the south, Apennines, the Pasadena Alps, for, as its name implies, it is a sheltering mother, protect-log its sun-kissed and flower-bedecked garden of the Lord from the winds which blow strongly in other regions. Picturesque and bold it stands, seamed with deep canyons, wooded gorges and precipitous cliffs. Its serrated summits look near enough to reach them by walking an hour, for the transparent atmosphere deceives. Its peaks are higher than the highest peaks of the White mountains, and one is instinctively seized with a desire to scale them and look down upon the fair panorama beneath.

This chain of mountains runs transversely across southern California, near the 34th parallel of latitude.

The Los Angeles Terminal Railway directly connects with the Mount Lowe Railway at Altadena Junction. Well-equipped passenger cars, fitted up with the most approved electric power, speed up Lake avenue, and in a few minutes land passengers at Hotel Rublo, from which point start the "White Chariots" of the Great Cable Incline, which latter has been designated "the most wonderful railway of the world."

At Altadena, also, are located the gas engines, working the electric dynamos which supply power for operating the trolley road to Rubio Amphitheater. These consist of two 60-horse power and one 100-horse power gas engines, with a capacity much larger than their specified amount.

The great cable incline called forth the praise of many engineers.

It extends from Rubio Pavilion, 2200 feet above the sea, to the summit of Echo mountain, 3500 feet in altitude. It is upward of 3000 feet in length, and makes a direct ascent of about 1300 feet.

The cars are permanently attached to an endless cable, and are so balanced that, in ascending and descending, they pass each other at an automatic turn-out, exactly midway on the incline.

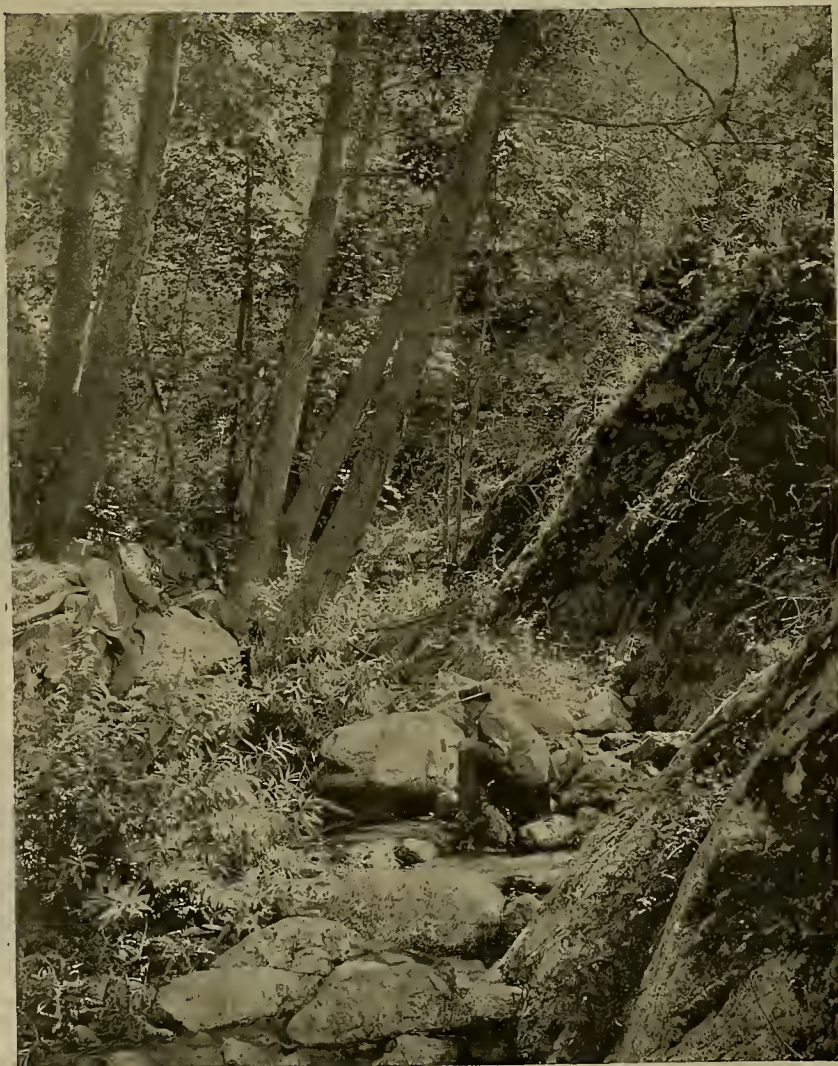
The cable is of the finest steel and was thoroughly tested to a strain of one hundred tons; and, as under any circumstances the loaded cars will never exceed five tons, its absolute safety is at once apparent.

As visitors ride up this great incline, few realize the arduous labor it represents. Not only were the ordinary difficulties of railroad building to be overcome, but the grade was such that burros had to carry cement and water for building the walls and buttresses, which, in places, were necessary ere the track could be laid; and as there were many points where not even burros could climb in safety, men carried the required materials on their shoulders. It will be apparent how much labor and cost were expended in its construction; and yet, up to the time of laying the last rail, it was the money, energy and engineering skill of one man who accomplished it, when the great majority, with less foresight and courage, regarded the undertaking as well nigh impossible.

OXYGEN GAS has been used successfully as an antidote in an extreme case of morphine poisoning.



GREAT CABLE INCLINE OF MT. LOWE RAILWAY.



GLEN CANYON NEAR ECHO MOUNTAIN.

Pocket Mining.

What is more encouraging and causes a person's mind to be chuck full of life and enthusiasm than to go forth in the fields among the hills on a bright, sunny, spring morn, with a pick, pan and shovel, as an honest pocket miner, in search of the hidden treasure which has been forever buried from the eyes of man. Every dollar that is taken out adds that much more to the circulating medium to supply the wants of the human family. The mode of mining as it has been followed by the pocket miners in the foothills of El Dorado county, and in the vicinity of the railroad station at White Rock, requires experience in this special kind of mining—that is, to know just where to prospect, and when to follow up a trace and when not to. The experience of most all pocket miners in the localities above referred to is that most of the gold deposits lodged in the pocket ledges have almost invariably been taken from near the surface, and scarcely ever at a greater depth than 20 or 30 feet. In prospecting by a pocket miner he commences with a pan of dirt from the surface, and if a trace of fine gold is found, with a favorable formation of the surroundings, he again takes another, and another pan of dirt, and if there is found a considerable quantity of flour gold, it generally is considered a good prospect, and then a search is made for a quartz ledge, which is prospected on until a pocket is taken out or the prospect pinches out and the mine is abandoned, which, perhaps, may be for years; and then some one else will go into the same prospect hole and continue the work a little farther and succeed in striking the prospect.—Folsom Telegraph.

Glen Canyon near Echo Mountain.

That portion of the Sierra Madre mountains reached by the Mount Lowe Railway is seamed with deep and picturesque gorges and canyons. Rubio canyon, as far as Thalehaha Falls, has been made accessible by plank walks, bridges and staircases. Over thirty thousand feet of lumber were carried on the shoulders of the workmen to build these walks, etc., for, prior to their erection, this canyon was absolutely inaccessible to the ordinary traveler. Rubio canyon, above Thalehaha, is known as Echo canyon, as it is the gorge immediately to the rear of Echo mountain. Then where it turns directly into the heart of the Front Range it is known as Glen canyon, for there is one large, wide glen and several smaller ones within its folds.

The engraving gives some idea of the deep serenity of this canyon.

At the sight of the beauties of this hidden spot, the foot is stayed in reverent wonder as the eye instinctively measures the depth of the canyon by the branches of trees which rear high their lofty heads to seek the sunlight. Even above the tops of these trees perpendicular walls rise on either side, which, from top to bottom, are garnished with mosses, ferns and pendant shrubbery.

Huge boulders turn the course of the little stream hither and yonder, in places forming quiet, limpid pools, then hurrying along as if on some forgotten errand.

Mind and eye absorb the surrounding scene; the nostrils inhale the indescribable mingled fragrance, and the heart is insensibly lifted in adoration from this marvelous creation to its Creator.

Scientific Progress.

To Protect Boiler Interiors.

The frequency of troubles with steam boilers, especially those used on seagoing vessels, caused by incrustation and corrosion, has been a source of so much expense for making repairs, to say nothing of delays, that every process suggested to minimize the difficulties is given special attention. There have been compounds upon compounds used to prevent these decays, and some have been found to be good and some otherwise, and few, if any, have been tried that have not injured in some way the internal surfaces of the boiler. A novel method, called an enamelling process, has been the subject of careful investigation and practical experiment, and is reported to have given good results. The method consists in the coating of the interior surfaces with a deposit in the form of a smooth black film or enamel, similar to an electro deposit, thick enough to protect the metal underneath from corrosion, and so thin that the boiler loses none of its steam-generating power. The application is simple, the process material being injected into the boiler through a cock of lubricator pattern at such times as desired, and the surface below the water level thus becomes coated with the enamel. The makers claim for the process that the enamel is impenetrable by acids, it protects the boiler from the corrosive agents contained in almost all not all waters, it prevents incrustation and does not injure the boilers. It is also claimed to be inexpensive, is convenient of handling and effective in its purposes.

Harnessing Electricity to Light.

Professor Alexander Graham Bell is spending these months at his summer place in Nova Scotia, engaged in a series of investigations which may have important results. His outdoor work is devoted to experiments in "aerial navigation," in connection with Professor Langley of the Smithsonian Institute, while in his laboratory he is endeavoring to demonstrate the problem to which he has given a great deal of thought and in which he thoroughly believes. It is to harness electricity to light as it has been harnessed to sound, so that people may be able to see a great distance, just as the telegraph enables them to write and the telephone enables them to speak a great distance.

Professor Bell firmly believes that it will be possible some day to see from Washington to New York as easily as one can convey the sound of the voice that distance. He insists that the fact has already been demonstrated, and that it only remains to construct the necessary apparatus to bring the discovery into actual and practical use. This is exceedingly difficult, much more difficult than the construction of the telegraph instrument or telephone, for the reason that the vibrations of light are so much more rapid than vibrations of sound. But Professor Bell is confident that he will soon be able to discover a diaphragm sufficiently sensitive to receive the vibrations of light and produce the effect necessary to convey the impressions to the human vision.

At the recent meeting of the Numismatic and Antiquarian Society President Brinton exhibited, among other objects of interest from primitive Central America, a perfect facsimile of a book that had been made and printed in America before the discovery by Columbus. The volume in question is a work on astrology, and bears internal evidence of having been written about the year 1450. The word "printed" properly describes the method that had been employed in the production of the work, movable stamps of wood, terra cotta or stone having been used in imprinting the characters. The art of printing is generally associated in the

minds of persons of this generation with the existence of a very high state of culture among those who practice it; and when the Maya characters, in which the literary remains of this early Central American civilization are written, shall have been deciphered, the primitive inhabitants of this continent may be found to have reached a much higher degree of literary culture than had ever been supposed to exist.

A THEORY has been advanced by a Russian, who claims to have made a thorough investigation of the source of natural gas, that the gas was the product of the salt water, which is found in that locality from 1200 to 1500 feet below the surface of the earth, coming in contact with the molten carbides in the earth's interior. It is reported, says the *Chicago Journal of Commerce*, that he has partially proved the correctness of this theory by subjecting the salt water to the conditions and producing a gas which could not be distinguished from the natural article. He also subjected this gas to the conditions of a further development of this theory, and produced oil similar to the oil found in gas regions. Apparently, therefore, as long as the salt seas remain and the earth retains heat, the supply of natural gas is not likely to become exhausted.

THE new Alsite solder for aluminum is stronger than the metal which it unites. The surfaces to be joined are cleaned by dipping in a hot solution of soda or potash, then dipped into nitric acid, rinsed in hot water and dried. Sometimes they are cleaned by filing the edges. The parts are heated as hot as can safely be done without melting, and a small portion of the solder is spread over the edges by means of a brush, which should be kept heated during the process.

TREES are now felled to a considerable extent by electricity. A platinum wire, heated white-hot by the current, is used, stretched between two poles, as a saw. There is less work than with a saw, no sawdust is produced, and the charring of the surface of division tends to prevent decay. In some cases the time required to fell a tree by this method is only one-eighth of that necessary for sawing.

THE science of surgery continues to develop new wonders. Its latest success is supplying artificial bones to replace deficient portions of the skeleton. A Frenchman has for a year or more enjoyed more than ordinary health with such a substitute bone in his upper arm. The artificial bone is made of vulcanite and attached in place with platinum wire.

MARFAN AND MONROT, two eminent French physicians, have recently shown that broncho-pneumonia and various other pulmonary maladies occurring in children are due to infection resulting from chronic indigestion, often the result of incorrect feeding. This was found to be the case in 13 out of 18 cases.

SO SUCCESSFUL has the enlargement of the Lick Observatory photographs of the moon proved that it is believed practicable to make maps therefrom on a scale of ten feet for the orb's diameter. Director Holden says that three-foot or ten-foot atlases will soon be undertaken, showing the different regions of the moon.

THE extent to which smokeless powders are used for sporting purposes now is illustrated by the fact that nearly a hundred marksmen competed for \$600 and \$400 prizes recently at Dexter Park, L. I., and only one of them employed the old-style black powder, and that only in one barrel.

THE wind, according to Professor Langley, is not a continuous and sustained force, but a structure consisting of a series of puffs.

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Mechanical Progress.

The Age of Steel.

The man who inaugurated the reign of steel by so vastly increasing its uses, and invented a method which makes the product even lower in cost than the kind of metal it was destined so largely to replace, ranks among the world's greatest inventors, though, like other remarkable creative minds, he did not reach his goal unaided by the skill and genius of collaborators.

The pneumatic process of making steel, by which Sir Henry Bessemer added more to the wealth of the world than any man of his generation, furnishes a curious example of what Tyndall, says *Harper's Monthly*, called the scientific use of the imagination. Bessemer, like Siemens and Thomas, who share with him the honors of modern iron metallurgy, was not a practical worker in the metals, but, unlike them, he was absolutely ignorant of aught beyond superficial chemical knowledge.

When he grasped the conception of burning out the impurities of pig metal by the oxidizing power of air, and thus reducing the excessively carburized material to the malleable state, he knew nothing of the traditions and science of the problem he was daring enough to attack. Had he been an adept it is more than probable that he would have been so imprisoned by the past as never to have reached so daringly into the unknown. He began his experiments secretly in a small way, after having visited numerous iron works to make himself acquainted with the existing processes.

It was not till the end of eighteen months that the fundamental principles of his great future success became perfectly clear to him—that of rendering cast iron malleable by a powerful air blast blown throughout the charge and not merely on the top, as in the old finery and the puddling furnace.

The heat developed was so great as to keep even wrought iron fused, and the happy inventor found by and by that he had succeeded in making steel in small quantities. It cannot be related here how he fought through the early difficulties of his work, and how the ironmasters of the age were alike astonished and delighted at his primary results. The shock to the inventor was scarcely less great when he discovered that in making steel in large quantities his process did not answer all his anticipations. His earlier successes had been with a pig iron smelted from high-grade ore, comparatively free from sulphur or phosphorus.

The attempt to work the process commercially involved the use of the common pig, which made up the bulk of the smelting material. The intense heat of the furnace burned out the carbon and the silicon, but left the phosphorus and sulphur untouched. This might have been remedied by using pure pigs containing but traces of these elements; but a graver defect attended the process. In many of the operations the ingot had no consistency; it crumbled under the hammer or in the rolls. In the language of the shop, it was rotten. The process, which, within a month of its first public announcement at the Cheltenham meeting of the British Association in 1856, had brought to its discoverer the sum of £27,000 in advance license fees, was now condemned by scientists and practical men as a visionary scheme.—*New York Commercial Advertiser*.

Paper Pulp from Logs.

A new machine for grinding a log into paper pulp and producing a fiber believed to be much better than that obtained by the Voetter method is reported from New England, but without names of inventors or place of trial. The case of the machine is of metal, over one inch thick, and very heavily made. Throughout its surface it is pierced with holes and the inner surface is

corrugated. Within is a heavy cylinder, the outer surface of which is corrugated, the corrugations running in a direction opposite to those of the casing. When the cylinder is set in motion and a log of wood is placed between cylinder and casing, the corrugations strip the wood into a soft, fluffy, fibrous material, almost like cotton; so nearly like it, in fact, as to be mistaken for cotton by the uninitiated. In the last stage of the operation this fibrous material is forced through the holes which pierce the casing of the machine.

Heating Iron in Water.

Raising iron and steel to a welding heat by plunging them into a bucket of water is one of the more recent electrical accomplishments which has excited no end of interest and admiration. The phenomenon was illustrated experimentally to thousands of spectators at the Columbian Exposition last year, but instead of being simply an interesting scientific demonstration, as it was there regarded, it has latterly been applied in a practical way as an everyday substitute for the time-honored forge fire. At the Edison Illuminating Company's Pearl-street station, at Brooklyn, N. Y., the "water-pull forge," as it has been aptly named, can be seen in daily operation, and the practical value of its astonishing performances has there been demonstrated beyond all doubt. Across the top of an ordinary wooden water bucket rests a bar of iron, to which the negative pole of a dynamo is attached by a wire. The other pole of the machine is connected with a plate of copper in the bottom of the bucket. To bring the end of any desired bar of iron or steel to a welding heat, all that is necessary is to rest it against the bar across the top of the bucket and to dip the point into the water within. This closes the electric circuit, and in a few moments the end of the bar becomes hot enough to be readily worked under a blacksmith's hammer. What actually happens when the circuit is closed is this: The water in the bucket, under the action of the passing current, immediately begins to decompose into its component gases, oxygen and hydrogen, and the latter adheres in a film to the submerged part of the metal bar, protecting it from contact with the surrounding water. If now the electric current were not very strong it would cease to flow, because of the break in the circuit made by the hydrogen accumulation. With a sufficient strength of current, however, the resistance of the hydrogen envelope is overcome, and in doing this heat is developed—sufficient in this case to quickly bring the end of the bar to a white heat. That the water does not quench the bar is readily explained by the fact that the hydrogen film prevents the two from coming into actual contact. How great the possibilities of this water-pull forge are can easily be imagined. The ordinary forge and blower, and the necessarily attendant coal and smoke and dust, all are entirely dispensed with, and the whole outfit may be a likely feature of the ideal blacksmith shop of the near future.—*Cassier's Magazine* for May.

Engineering Skill.

An ingenious use made some time ago of a rapid river current in India aptly illustrates the fertility of resource of the average engineering contractor. At a certain point along the river a temporary bridge was urgently necessary for the transportation of materials to be used in the building of an important neighboring structure, but the only available material was a quantity of three-inch planking, about ten feet long and a little over three feet wide, and some ordinary round timber cut from a neighboring forest. Pontons were made of two single planks, placed about 15 feet apart, each plank being held on edge at an angle of about 50° from the vertical, both inclining up stream, and kept at their proper distance

by framing made from the round timber already mentioned. Both pontoons were moored to a chain. The peculiarity of the bridge, of course, was that the water pressure upon the inclined surfaces of the planks, due to the swift current, permitted them to carry a considerable load, and the structure served its purpose admirably, accommodating a pretty lively traffic for an unexpectedly long period.

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Possibilities of the Telephone.

The possibilities of the principles of the telephone are so great that they form an interesting field for the investigations and experiments of electricians the world over. The possibility of using the water as a method of telephonic communication are now being developed, and it is almost a certainty that before long moving ships at sea will be able to communicate with one another, though they are outside the range of vision, and that a warning of the approach of icebergs, derelicts or other ships will be given by electrical apparatus attached to vessels. Professor Cottadon has recently made interesting experiments in this line, and they have been repeated by Captain Neale, of the British navy, on the Thames. In sufficient depth under water a membrane was caused to emit vibrations of what electricians call a "definite color." These were transmitted through the water to a considerable distance and repeated on the membrane of a similarly constructed apparatus, whose membrane was "equivalent" with the membrane of the first apparatus. A telephone is attached to the apparatus, and thus the signals are transmitted to the place where they are wanted on board the vessel. In this manner signals have been transmitted for fifty miles. In 1892 Dr. Ernst Huber, of New York City, patented an apparatus of the kind referred to, and a company was formed to construct it. The Government took considerable interest in it, and offered Dr. Huber the privilege of using a man-of-war on his experiments. The invention attracted considerable attention at the time, but for some reason the proposed experiments were not made. Dr. Huber turned his attention to other things, and the invention was forgotten. Before getting his patent Dr. Huber made some successful experiments with his apparatus. In the Huber sea telephone the sound waves passing through the water cause metal strips to vibrate, and the vibrations are transmitted by wires to microphones, which greatly intensify them. A device called an indicator shows the intensity of the sound vibrations, and this gives an idea of the distance of the object causing them. By turning the apparatus, which is intended to be attached to the bottom of a vessel, the direction from which the sounds come can be determined. By an ingenious device all sounds made by the ship itself are eliminated, and only those made by extraneous bodies are felt and recorded. By ringing an electric bell attached to the apparatus, sound waves are spread in all directions, and are reflected back upon meeting an obstruction. When they are reflected back they affect the membrane of the apparatus and give notice of the approaching danger. Icebergs and submerged wrecks can be detected in this manner. The inventor declared that he was able with his apparatus to discover the presence of any obstruction within ten miles. The possibilities of such an invention, should it work successfully in practice, are immense.

Uses for Vagrant Electricity.

A great deal has been said in the last two or three years about the mischief wrought by electricity generated for lighting or trolley systems and returning to the central station through the earth. Even where the rails are used for return purposes, and are carefully joined by copper bonds, some of the current, it is said, still leaks away, and corrodes gas and water pipes, eats away the sheathing of telephone cables, and, by leaking small gaps, gives a spark that may be the cause of a disastrous fire. But certain incidental benefits resulting from such meanderings of electric energy are also reported occasionally. The difference in the potentials of two vagrant currents coming into houses in Cambridge, Mass., on water

and gas pipes is such that by connecting the two pipe systems there is a sufficient flow from one to the other to run small motors and incandescent lamps; and electric door-bells are also operated in the same manner. Referring to an old scheme for connecting telephones with gas and water pipes, and using the latter merely as conductors for a current otherwise provided, a writer in the *Electrical Review* recently expressed the belief that "In any of our large cities where the rails serve as the return conductor for railway currents sufficient current traverses the water and gas mains to conduct the above-described experiment, using the leakage current as the electric source for the two transmitting instruments."

Electrical Dangers.

The report of Electrical Expert Low to the Pacific Insurance Union, based upon actual experiment and observation, brings to light a new source of danger from electric roads in cities. Not only does electrolysis destroy water and gas mains, as has been stated before, but these mains, being good conductors, become charged with electricity, and wherever there is a break in the connection are ready to discharge the subtle fluid, as is the rule with all conductors.

By tests made along the lines of one of the electric railroads now in operation it was found that the mains of the Spring Valley Water Company and of the San Francisco Gaslight Company were highly charged with electricity. At one place a connection was made between the water main and the track through the volt meter, and a pressure of sixteen volts was recorded. The ampere meter was then connected, and it showed the startling figures of 116 amperes. When it is recalled that one-half an ampere is sufficient for a sixteen-candle power electric light the result of these tests will be appreciated.

Suppose that this powerful current, intercepted in some way, finds a leak in a gas main or pipe, or that it finds a conductor in a house connection from a water main or gas main, who could answer for the consequences? There might be a terrible explosion or a great fire, and nobody would be able to foresee it or guard against it. The vagaries of the electric current are not thoroughly understood, even by scientists, but enough is known to enable any one to comprehend the danger which lies in vagrant electricity.

Something will have to be done to correct these manifest evils attending the trolley system, or the system will have to be abandoned in cities. In the country, where iron mains and pipes are unknown or are very rare, the leakage of the electric fluid may be innocuous, but in cities it is such an obvious element of danger to the community that some method must be devised to prevent it.—Chronicle.

Mechanical Force Derived Directly from Coal.

With certain transformations of energy of chemical action into electricity, of electricity into light or heat, and of heat into power, every school-boy is as familiar as he is with the general principle of the mutability of force. But some interesting experiments lately conducted by H. Carey Lea reach out into a new department of this field of thought. He has been trying to see whether he could produce chemical change from mechanical energy. Light, as one discovers in photographic experiments, has the effect of darkening and reducing, or disintegrating, certain salts of silver, bromides and iodides. Mr. Lea finds that he can produce similar results merely by compression. In some of his attempts he exerted a pressure of a million pounds to the square inch.

From a commercial point of view this is a valuable expedient; but a principle has thus been established. Now, what the physicists would like to know is whether that opera-

tion can be reversed and chemical change can be made to yield mechanical force directly. In a primary, or a secondary battery, chemical action produces electricity, and this can then be converted into mechanical force. So, too, by burning we get heat, and then can turn heat into power. But what certain investigators are trying to ascertain is whether the intermediate stage cannot be dispensed with, and, if so, how. The particular object in view, or at least one important aim in this inquiry, is the discovery of a way to obtain from coal something like the full amount of energy that is stored up in that familiar compound. It has been asserted that by our best methods of combustion, in connection with a steam boiler and engine, only about one-tenth of the work is extracted which the sun placed on deposit therein away back in the vegetative processes of the carboniferous era. A tremendous revolution in the methods and cost of all manufacturing operations and in propelling cars and ships would be wrought if ever a secret of this sort were wrung from Nature. And her mysteries, it is safe to say, are not yet all unravelled.

Branding by Electricity.

A novel system of branding horses, cattle and sheep is reported from Australia. The brand is kept the required heat by electricity from storage batteries. From these a flexible rubber tube carries the electric energy to the brand, which is heated from within. It is claimed that this brand is perfectly safe, that it marks without a blotch, and is kept at a uniform temperature.

THE ship channel from the Gulf of Mexico to the city of Mobile is soon to be lighted by electricity. The plant will be the largest so far used for a similar purpose. The channel is thirty miles long, and the alternating current system has been adopted.

THE Niagara Falls electrical power plant will not be ready for service, it is now announced, until October. The tunnel opening was first expected in February last, and then a postponement until June was necessary.

THE current required by the electric rail-welding process of one of the leading makers of machinery for this purpose has a volume of 50,000 amperes, but a potential of only four volts.

OVER 200 electric street-railway lines in the United States are now equipped in whole or in part by electric heaters. Their superiority to the coal stove in every respect is obvious.

AN unconfirmed report is that a North Dakota engineer has invented an electrical boiler alarm, which gives timely warning of conditions conducive to explosions.

THE *Electrical Review* learns that a Frenchman has invented an electric mosquito bar which electrocutes insects which come in contact with it.

THE city statistician of Chicago reports that there are 150 establishments for "electric light, works and materials" in that city.

THE cost of transmitting electricity from Niagara Falls to Albany is estimated at \$27.53 per horse power.

A SWEDISH COPPER MINE has been worked without interruption for 800 years. In 1650 it produced enough copper to have met the requirements of the whole civilized world, and it is estimated to have had a total yield in eight centuries of 1,200,000 tons, worth—at the average value of \$140 per ton—more than \$160,000,000. A record of its production has been kept for 261 years. The output was 1336 metric tons in 1633, reaching a maximum of 3445 in 1650, and slowly decreasing since 1690, being 271 tons in 1891.

Practical Information.

Rosin in Beer Kegs.

If you should happen to get a smack of rosin in your glass of beer, as it is quite likely you may at this time of the year, don't imagine that the brewers are substituting pine shavings for malt and hops to make the beer from.

Some brewers, says the New York *Sun*, are guilty enough, perhaps, as it is, with their substitutions of corn, rice and glucose for malt, but they do that simply because you insist upon having light colored beer. The reason why you may detect a rosin flavor now is that this is the season when the brewers pitch their kegs.

It may interest you to know that the beer you drink never comes into contact with wood, either in the kegs in which it is delivered or in the great vats in which it is fermented. If it did, the wood would sour and spoil the beer. The vats are protected on the inside with repeated coatings of shellac varnish, renewed whenever it is necessary. This used to be an exceedingly dangerous operation before the general introduction of incandescent electric lights; for an open light was liable to set fire to the fumes of the alcohol used in the varnish and produce disastrous explosions in which men were maimed or killed.

The pitching of the kegs is an interesting process. When a keg is empty and the bung and vent plugs are out, stick a lighted candle into the bung and look into the vent-hole. You will think you are looking into a glass barrel. Every part of the inside glistens. The keg has a complete coat of rosin. After a year's use this gets many minute cracks in it and needs to be renewed, and the springtime is the brewer's favorite time for doing this, before the great summer trade begins. The drivers do not enjoy pitching time, for they have to do the work, helping the brewery coopers. As they bring back their loads of empty kegs—sixths, quarters and half barrels—these are ranked up next to the wash-house, where a big kettle of boiling rosin is ready for use.

Before the new rosin is put in the old coating is to be melted out. A curious machine with two arms is the first of the devices that comes into use.

The kegs are hung on this, with an arm of fire thrust into the venthole. Presently a stream of boiling rosin comes from the open tap. A keg is taken off, tipped over a barrel where the waste rosin is poured out, and passed to a cooper. He sounds the head, discards the keg if it is defective, but if not drives a plug of wood home in the vent and passes the keg on. One man now pokes a long-handled funnel into the tap-hole and another pours a ladleful of boiling rosin into the keg from the kettle.

A cooper seizes the keg, drives another wooden plug home into the top hole, and gives the keg some curious twirls which spreads the rosin over every part of its interior. Then he knocks both plugs out and tosses the keg upon a set of rollers going slowly around by steam power. Here the surplus rosin runs out and the keg rolls until the rosin which remains cools and sets.

The kegs are rolled into the wash-house, ranged up on end, the rosin burned out of the vent and tap-holes, a new plug put in the vent, and the kegs filled with water. The water is meant to soak out the rosin taste. As fast as these operations are finished a man with a paint pot and brush follows along the line and puts a dab of paint on the front of each keg. If the kegs were marked with white at the last pitching time he uses red, or white if it was red before.

In the Cascade mountains, about 75 miles northeast of Jacksonville, Oregon, the seeker for the curious will find the great sunken lake, the deepest lake in the world. This lake rivals the famous valley of Sinbad

the Sailor. It is said to average 2000 feet down to the water on all its sides. The depth of the water is unknown, and its surface is as smooth and unruffled as a mammoth sheet of glass, it being so far below the mountain rim as to be unaffected by the strongest winds. It is about 15 miles in length, and about $4\frac{1}{2}$ miles wide. For unknown ages it has lain still, silent and mysterious in the bosom of the great mountain range, like a gigantic trench scooped out by the hands of a gigantic geule.

Acreage Under Irrigation.

Following is an estimate of the acreage of land now under irrigation in the United States, together with the number of acres under cultivation. It is believed that California has not only a greater area of land under irrigation systems, but a larger per cent of the irrigable land is cultivated than in any other State or Territory except Arizona:

	Under Irrigation	Under Cultivation.
Arizona.....	650,000	400,000
California.....	5,500,000	3,800,000
Colorado.....	4,000,000	2,000,000
Idaho.....	1,500,000	375,000
Kansas.....	300,000	125,000
Montana.....	1,500,000	400,000
Nebraska.....	350,000	100,000
Nevada.....	200,000	100,000
New Mexico.....	900,000	400,000
North Dakota.....	15,000	5,000
Oklahoma.....	10,000	.....
Oregon.....	300,000	120,000
South Dakota.....	125,000	75,000
Texas.....	400,000	185,000
Utah.....	750,000	430,000
Washington.....	1,000,000	200,000
Wyoming.....	1,500,000	200,000
Totals.....	18,000,000	8,915,000

With the completion of the irrigation systems now under construction it is safe to say that 50 per cent may be added to these figures.

How to Make Whisky.

It is a very simple matter to make an illicit still. A man who knows how can make one in a very few minutes, and it will cost practically nothing. The moonshiner frequently takes an old sprinkling can and solders the top on tight. Then he arranges a bucket of water and cuts a hole near the bottom of the bucket to allow the rubber hose, which he will attach to the spout of the sprinkling can, to pass out after he has coiled it in the bucket and thus made a worm. Then he pounds up some corn and puts enough water with it to make a mush, fills his sprinkling can, builds a fire under it, and there he has a still. The steam which arises from the mush is condensed as it passes through the hose, and when the condensed liquid trickles out of the other end it is whisky.

A Good Point About Cable Cars.

Some people have an idea that when anything goes wrong with the cable the car may suddenly begin moving at some terrific rate of speed, carrying everything before it until it dashes itself and its unfortunate passengers to pieces. Any one who takes the trouble to think about the matter will realize that under no circumstances can the car go faster than the cable itself, or eight miles an hour.—Scribner's.

ANOTHER RAILROAD that transfers trains with locomotives by means of huge ferry-boats is the Baltimore & Ohio. An entire express train—and a lot of coal cars also, perhaps—is regularly ferried from Canton to Baltimore on the Robert Garrett, across the "northwest" branch of the Patapsco.

THE oldest piece of wrought iron in existence is believed to be a sickle found near Thebes. It is about 4000 years old.

If one could sell the sea at one cent per 10,000 gallons it would bring \$25,000,000,000.

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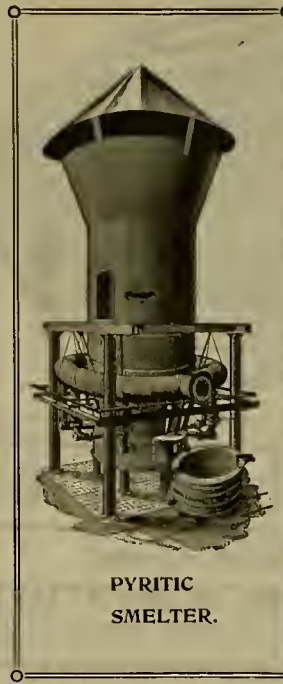
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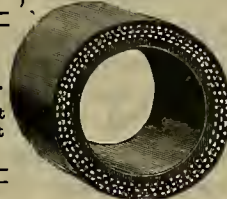
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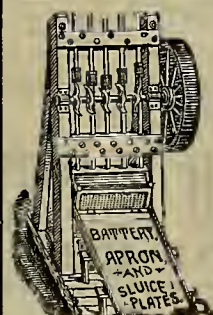
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Table of Contents:

Preface; Introduction; Implements; Assay Balance; Materials; The Assay Office; Preparation of the Ores; Weighing the Charge; Mixing and Charging; Assay Litharge; Systems of the Crucible Assay; Preliminary Assay; Dressing the Crucible Assays; Examples of Dressing; The Melting in Crucibles; Sinterification; Cupellation; Weighing the Bead; Parting; Calculating the Assay; Assay of Ores Containing Coarse Metal; Assay of Roasted Ore for Solubility; To Assay a Cupel; Assay by Amalgamation; To Find the Value of a Specimen; Tests for Ores; A Few Special Minerals; Solubility of Metals; Substitutes and Expedients; Assay Tables. The volume embraces 130 12mo. pages, with illustrations, well bound in cloth, 1893. Price, \$1, postpaid. Sold by DEWEY PUBLISHING CO., Publishers, No. 220 Market Street, San Francisco.

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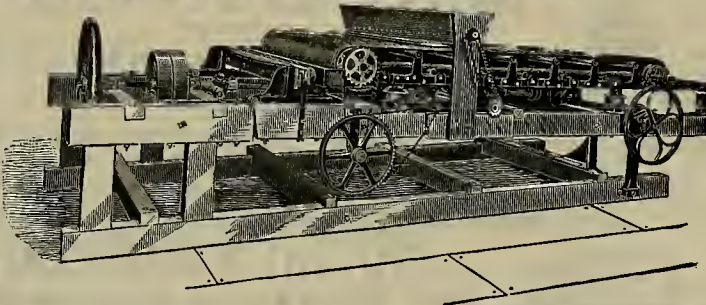
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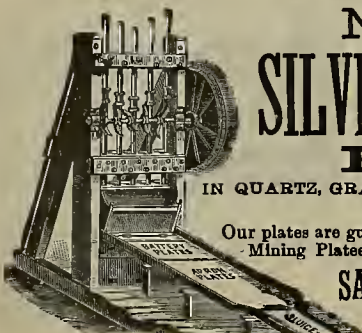
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Mining Summary.

The following is mostly condensed from journals published in the interior, in proximity to the mines mentioned.

CALIFORNIA.

Kern.

THE DESERT MINES.—The rush to the Red Rock, Goler, Summit and Black Mountain mining districts still continues, and each day outfits pass through Mojave in their search of gold. In answer to inquiries the majority of prospectors state that they have nothing else to do and are taking the gambling chance of discovering gold or hope for something to turn up. It is needless to state that the majority of them return disappointed, and, what is worse, broke. All classes and followers of every trade and profession have become prospectors and are on the desert hoping against hope to obtain a portion of the desert gold.

Exaggerated stories concerning the amount of gold taken out can be heard on every hand, and with each repetition the story grows as everything else in this glorious climate. There is no doubt of there being gold in all these districts, but the amount has been very much overestimated. The greater number of the people going into these camps are not practical prospectors; they have never been on a desert and go wholly unprepared for the hardships which they have to endure.

At the stations of the borax company water can be secured when there is a surplus, but at other times it must be sought elsewhere. There is water six miles from Mojave, at a borax station; again at Nugeles, 16 miles from Mojave; at Red Rock, Kane Springs, 27 miles from Mojave; at Mesquite Springs, six miles farther. From the latter place water is hauled a distance of six miles to Goler, and to Summit, 13 miles. At these camps water is sold at \$1 per barrel of 50 gallons.

As in all mining camps, nearly as many leave every day as arrive, and the population shows but little increase.

At Red Rock but three mines are in operation—the Sullivan, Bonanza and one other. These are paying wages, or about \$4 or \$5 per day to the man. The reports of the fabulous wealth of the quartz vein known as the Mexican mine, are laughed at here as they are supposed to emanate from interested parties. It is a well-known fact to oldtimers that the same ore was discovered and worked in 1867 at a stamp mill erected about three miles above Red Rock, at a place which was known as Sageland. Negotiations are pending, however, for the bonding of the Mexican mine for \$10,000. There is but little use of a prospector going to Red Rock unless he wishes to buy, as all the ground is taken up for miles around.

At Goler there are, perhaps, a dozen men at work dry-washing, although a number of prospectors are on the ground.

At Summit not more than 15 men are mining, some of whom are not making board, while others are averaging \$10 per day to the man. Claims can be bought from \$2.50 up, and many are anxious to sell for anything they can get. The camp is not a very prosperous one, yet it is as lively as any of its neighbors.

Some discoveries have been made recently in the Black Hills, but their extent is not yet known. The difficulty with the entire district from Red Rock to Summit is that it is located and held only for speculative purposes. Color can be found in nearly every gulch, but gold in paying quantities has not been discovered in many places. None of these places can become mining camps of any magnitude until the horde of lazy, porcine speculators and land-grabbers are rooted out.

There is no grass on the desert, and horse feed has to be hauled from Mojave; water is a luxury and gold scarce. Taken altogether, the desert gold fields contiguous to Mojave are not the place for a poor man to venture into at present. Between the gambling sharks of Mojave, the scarcity of water and the high price of provisions, many leave here "sadder but wiser" men.

Canfield and associates, who bought the Bonanza claim at Red Rock and have since been purchasing adjoining properties, have now at Mojave a lot of pumping machinery. The plan is to pump water from Kane Springs right over the mountain—a raise of at least 1200 feet—and then use it on the western or Red Rock slope for eluvial and, possibly, hydraulic purposes. It is a big scheme and will cost pots of gold to carry out.

At the new mining camp in the desert, called Black Hills, the Lee Brothers have opened a bed of gravel, some 15 feet in thickness, which prospects finely in gold throughout. This district is about 12 miles northwest from Red Rock and entirely away from what has been considered the course of the Red dry river. It is another one of the peculiar features of that desert country, in the line of things that no one can explain. The lack of the camp is water, for so far there is nothing like a spring in the entire district.

Another discovery of quartz very rich in gold has just been made near Dove Springs. This region between the Mojave desert proper and Kelso valley has for years been known to have rich floats, and now both the mines recently discovered are producing very rich ore.

A man well posted in mining affairs, who has given the desert gold fields careful examination, states that it will be a poor man's country for years and years. As he expressed it, "If all the Industrials could be turned loose over there and were a mind to work they could make good wages for years and years." But he does not deem it a good place for investment and operation on a large scale by companies. And in this view he is undoubtedly correct.

It is stated that Guey Miller of Havilah is now mining antimony and selling it on the dump to San Francisco for \$20 a ton.

Add this to the hauling and crushing costs, and it will be seen that this is about equivalent to quartz that mills \$30 a ton in gold.

Lassen.

HAYDEN HILL.—Big Valley Gazette: Hayden Hill is reviving. We made a flying trip to that camp last Saturday, and found things looking more prosperous than they have for years. A new double shaft has been sunk on the Golden Eagle to a depth of 300 feet, and a force of eight men are now at work in the mine. Mr. W. B. Scott and Dr. A. G. Schloesser of Chicago, two of the owners of the mine, arrived at the Hill last week, and it is confidently expected that a still larger force will be put on soon. The mine is in charge of W. C. Howard as superintendent.

Nevada.

WILL BROIN BREASTING.—*Transcript*: Tomorrow the work of breasting out the gravel will begin at the Odin drift mine. Some very rich gravel has been uncovered there lately and there is enough in sight to keep a good force of men at work right along. More miners will be put on as room is made, but the increase will be gradual and places have been already promised to as many men as will be wanted.

FINE ROCK.—*Timings*: Supt. Waggoner brought in some very fine rock from the Granite Hill mine to-day, which came from a new ledge just uncovered. It is well filled with sulphurets and galena and shows considerable free gold. The Granite Hill is rapidly coming to the front.

DAISY HILL.—*Telegraph*: M. C. Taylor has received word from San Francisco that full arrangements had been made to start work on the Daisy Hill mine immediately. Charles Taylor, who is superintendent for the company, is expected to arrive here this evening or in the morning, and building will be started right away.

CEMENT MILL STARTED UP.—*Transcript*, May 28: Messrs. Ashman, Peterson, Simmons and Whalen started up their cement mill to-day. They have 80 tons of the cement in the mill and about 300 tons near the track. The cement deposit that they calculate to work is about 15 feet deep and covers two acres of ground, which they have leased for two years from Mrs. Storey. Water power to run the five-stamp mill has been brought from one of the town reservoirs, for which purpose 2000 feet of pipe was required. The mill will crush 20 tons every 24 hours and will be kept running day and night. The works are located in the old diggings off from Orchard street, and the material that is to be milled was left when the ground was worked by the hydraulic process a good many years ago.

Plumas.

THE PILOT PEAK MINE.—*National Bulletin*: Plumas Turner came down from Onion valley last Tuesday. From him we learn that a very important and rich development has been made in the Pilot Peak mine, a property which has been attracting considerable attention during the past year and which has been promising well. Last week Mr. Turner and others, having resumed development work, cut into a large vein of ore heavily charged with arsenical sulphurets carrying gold in such quantities as to make of the lode a highly valuable mining proposition. The tunnel is in 128 feet, and the face of it is 65 feet below the surface.

When the owners began prospecting the mine the ledge seemed to consist of a series of small veins carrying rich sulphurets. The present development indicates that all these veins converge into a big chimney of rich ore, and of a character new to miners in that part of the State. From the point where this strike has been made, Mr. Turner estimates the distance to the footwall to be 50 feet. The ore is about one-fourth sulphurets. The owners consider that they have one of the biggest mines in this part of the State. This property is situated on the northern slope of Pilot Peak, a mountain 7500 feet high, at the headwaters of Poorman's, Hopkins', Onion Valley and Dixon creeks. The first two particularly were very rich in placer gold, and in early days yielded up to the miners their thousands. The source of this gold was thought to be parts of rich ledges running into Pilot Peak in the vicinity of the mine under discussion. Mr. Turner is confident that his company has discovered the source of much of the gold found by the pioneers in such generous quantities in the streams below.

BIO YIELD OF GOLD.—*National Bulletin*: Word comes from Prattville that in five days Fred Scott had taken from the King drift mine on the North Fork the sum of \$700 in channel gold. We are glad to hear such good news. This property is at the lower end of Big Flat, through which for a distance of nearly four miles an ancient auriferous channel runs.

The Glacier mine is at the upper end of the flat, and the Angie Cameron mine is near the center. There is scarcely a doubt that here is one of the biggest mining propositions of the county.

San Bernardino.

VANDERBILT DISTRICT.—*Pioche Record*: James Clark of Desert Springs came in Saturday from Vanderbilt, where he has been residing for the past three months. He says that mining and milling are progressing favorably in that section, and there are not many idle men in camp. The great difficulty is the scarcity of water, which is a detriment to the steady run of the mills. Green Campbell is sinking on the Boomerang mine and as soon as water level is reached calculates to obtain sufficient water for all milling purposes. There is considerable prospecting going on in the neighboring hills for water, but so far the results are not favorable for any great supply. There are three men at work grading on this end of the railroad, but this is only a temporary force and will be increased.

Many men are chloriding on small streaks of

gold-bearing quartz, which will be run principally at the Bronze mill.

While there Mr. Clark met some Piochers, among them Dick Rich, who is carpentering at the Crescent mill; Hank Goodrich, who is erecting an assay office in connection with the Crescent mill, and Joe Goodrich is helping to put up some machinery at the same place. Places of amusement are springing up and the camp generally presents an air of activity.

NEVADA.

Washoe District.

CON. CAL. AND VIRGINIA.—1650 level.—The south lateral drift No. 3 in the ore body recently found started from the west crosscut 28 feet below the sill floor of this level and 14 feet under south drift 2 has been extended during the week 5 feet in good ore, total length of the drift in ore 26 feet; the face of the drift is all in ore which will average \$30 per ton. Most of the time was spent in completing the timbering of the drift, and work in the face was temporarily suspended, but the work of extending the drift will be resumed in a short time. South drift 4 on the 1700 level is being reopened for the purpose of being extended to traverse the ground at a depth of 22 feet below the south drift 3. The ore extracted during the week amounted to 131 carloads, about 129 tons, the average assay value of which, per car samples, was \$30.58 per ton. This ore came from south drift 3 and from south drift 1 on the sill floor of the 1600 level. 1000 level.—The Rile drift.—The upraise on the east side of the main drift at a point 535 feet south from the shaft station has been carried up 15 feet, total height, 65 feet, in porphyry, clay and quartz carrying some value. From the top of this upraise an east crosscut has been advanced 20 feet, face in hard porphyry. From the main drift at a point 370 feet south from the shaft station a west crosscut has been advanced 55 feet, face in porphyry and quartz.

In the Ophir mine no changes are reported in the 1465 level workings. In the old Central tunnel the north drift from the old Mexican shaft on the tunnel level has been extended 10 feet; total length, 53 feet. From this north drift at a point 26 feet north from the shaft a west crosscut has been advanced 21 feet; in porphyry and clay. The northwesterly drift started from the shaft on the west side, at a point 56 feet above the tunnel, has been extended 41 feet; total length, 83 feet, in porphyry and clay. The usual prospecting work was done on and above the 1465 level of the Mexican mine, with no changes in formation reported. On the 900 level of the Union shaft the Union Con. and Sierra Nevada joint west crosscut started near the north line of the Union Con. mine from the joint north drift at a point 1520 feet west of the shaft has been extended during the week 24 feet; total length, 112 feet; face in hard porphyry. From the joint west drift at a point 1520 feet west of the shaft a joint lateral drift has been advanced 10 feet; face in porphyry and clay. In the Andes mine the upraise from the west crosscut that connects the north lateral drift with the main north drift has been carried up 12 feet; total length, 23 feet; formation, quartz and porphyry. In the Sierra Nevada mine the west crosscut No. 1, from south lateral drift 660 feet south of intermediate tunnel, has been advanced 30 feet; total length, 105 feet; face in clay and porphyry.

In the Best & Belcher mine on the 200 level they started on north boundary a northwest drift 1115 feet from main northwest drift and advanced same 16 feet, passing through porphyry and quartz giving low assays. 800 level.—Northwest drift started in crosscut 2, 415 feet from main north drift, has been extended 14 feet, passing through quartz and porphyry; total length 26 feet. In the Gould & Curry mine on the 200 level west crosscut 5 started in northwest drift 432 feet from the main west drift has been extended 19 feet, total length 1100 feet; passing through hard porphyry.

In the Potosi mine, on the 450 level, the south drift is in 494 feet. The face is in porphyry and low-grade quartz. The west crosscut from this drift, 200 feet from the north line, is in 131 feet. The face is in low-grade quartz. In the Chollar mine the north drift on the 100-foot level is in soft porphyry. The west crosscut from the lateral drift 300 feet south of the north line on this level is out 309 feet. The face is in porphyry and quartz, the latter averaging from \$5 to \$15 per ton. In the Bullion mine the west drift from station on the 820 level of the Ward shaft is in 820 feet. The face is in block porphyry. At the Alpha shaft they are still retimbering near the 200-foot level.

ALL EXCITEMENT AT KENNEDY.—*Winnemucca Silver State*: The excitement over the rich strikes in Kennedy is increasing every day. All who visit the camp agree that it more than equals any former discovery in the State, some not even excepting the Comstock.

There have been over 400 locations made, and all that work has been done on show good healthy ledges that assay well in gold—some very high, but all good enough, with a mill near by, to work at a handsome profit. The Imperial, which was purchased by Mr. Wardner, has over 400 tons of \$30 ore uncovered that can be taken out in short order and milled at very slight expense, and the chances are that by the time that it is taken out he will have as much more uncovered, as he intends pushing the tunnels right in, and from the croppings it looks as if the ledge extends the whole distance of 4300 feet that he owns.

A REORGANIZED DISTRICT.—*Pioche Lode*: On the 21st inst., what was formerly known as Chief district was reorganized and called Panaca district. The central point is Chief mountain, which is about 16 miles south of Pioche, and the new district is about twelve miles

square. A great many mining locations have been made during the past month in that vicinity, some of them being considered very promising. The most important location and about the only one upon which any work has been done is the one owned by Lee & McGown, which continues to improve as development work goes ahead. The formation and ledges are porphyry, quartz and quartzite, being very similar to Ferguson district.

John Hues and others have opened up a splendid showing of gold ore on an old abandoned ledge near El Dorado canyon, in the southern portion of the county. The Kingman Miner says the ledge is three feet in width and a sample of the ore without cleaning gave a return of \$32.50.

The Condon mill continues to produce the yellow material, another \$10,000 bar being now ready for shipment. It is expected all the Jim Crow ore on hand will be run through by June 1st, when a final cleanup will be made.

TWO MINES BONDED.—*Walker Lake Bulletin*: Two mines in Silver Star district—the Dunlap and the Midwinter—were last week bonded to the Garfield Company. According to the agreement the company must begin work at once and work continuously on the mines. They agree to pay to the locators (Dunlap and Truman) 25 per cent of all ores extracted, and within 18 months they agree to pay \$15,000, and within six months thereafter they must pay \$15,000 more, making \$30,000 in all.

THE NEW GOLD MINES.—*Reno Journal*: George Cutting has returned from Esmeralda county, where he has been since the first of February last. He went to Douglas, in Silver Star district, the new mining camp in Esmeralda county. The mines are gold bearing and the prospects are good for a prosperous camp. Ed. Brown took a carload of ore from the Hard-scrabble mine to Taylor's mill at Silver City which assays from \$100 to \$125 per ton. Thorne and George sent over two tons of ore to Hawthorne which worked \$65 per ton in an arrastra at that place.

The mines were discovered last fall, and there are about 130 locations recorded to date, many of which are good prospects. A mill will probably be erected in the district this summer. There is plenty of nut pine wood and water enough for milling purposes in the district. Douglas, the new village which is being built in the district, is about nine miles from Soda Springs on the Carson and Colorado railroad.

Mr. Cutting says the silver mining districts of Esmeralda county furnish an object lesson of the ruin caused by goldbug domination. Villages which a few years ago were prosperous are now deserted. Fine buildings are crumbling into ruins, quartz mills are rusting, the mines deserted and desolation is everywhere. There are several silver mines which show up large ore bodies that cannot be worked at present. There is ore in Tule canyon, about 140 miles from Candelaria, that assays over 500 ounces of silver to the ton, but in consequence of the great expense of mining, hauling, etc., and the low price of silver, it cannot be worked at a profit.

ARIZONA.

BEADSHAW'S MINERAL.—*Prescott Journal-Miner*: The Crowned King mine and mill, which have been running steadily for the past five months, with a large force of men, eighty all told, and have been producing a large amount of bullion and concentrates, having made one of the most successful runs in the history of this mine, is now compelled to run on very short time on account of the scarcity of water. The test run made has proven highly satisfactory to the owners, and the work of development continues with a large force of men. A new pump is being put up at a spring above the mill. A pack-train of 20 burros is kept busy packing in wood, while the building of houses and hamlets of the miners still continues.

The old Del Pasco, now being worked by Bandedbug & York, and owned by Lester Jackson, situated about half a mile west of the Gladiator, and one of the oldest locations in this district, a mine that has produced thousands of dollars in bullion and placer gold, is now being developed by a crosscut and drift, which taps the vein at a depth of 300 feet from the surface. In the drift there is a very rich streak of ore assaying from \$200 to \$400 per ton.

Weet of the Del Pasco 500 yards is situated the Old Reliable, owned by Bashedoff & Brumier. The Old Reliable is, and has been, a famous producer. It is a large vein and a true fissure in granite. This mine is developed by a 1000-foot tunnel on the ledge, and by crosscut drifts, stopes, etc., in all amounting to 1600 or 1700 feet. The ore is free milling and runs from \$20 to \$200 per ton in gold. There are other claims on this lode belonging to the same company, and are now being prospected under the management of Mr. Liston. The property is one of the most valuable in this district.

The Wild Flower, another well developed property, belonging to the same company, is situated one-fourth of a mile north of the Old Reliable. A tunnel has been run on the ledge 1000 feet, and it shows a 14-foot ledge of ore averaging from \$7 to \$20 per ton in gold. Above this main tunnel another tunnel is being run, and it is in now about 180 feet. There are six men working in this tunnel. This tunnel has produced very high-grade ore, and there is now on the face a foot of ore that runs from \$40 to \$200 per ton in gold. This mine is provided with a five-stamp mill for the reduction of its ores, one stope, poettifice, boarding-houses, hamlets and other modern conveniences.

West of the Wild Flower one mile is situated the Sultan. This is a new mine, and only has been worked this year. It is a true fissure vein in granite, and is situated on the south side of the mountain, being the extension of the

Green Mountain mine (patented). Work was commenced on this property about three months ago, and from the grass roots there has been a continuous streak of free milling ore 12 inches wide and averages from \$25 to \$60 per ton in gold; the tunnel is in 70 feet, and the ore is improving as depth is attained. A crosscut is being run, and when it taps the ledge will have over 500 feet of etoping ground. This is one of the most promising mines in the district. There are now 20 tons of ore on the dump that will be milled next week at the Old Reliable mill. This property is owned by Ernest Arnez and M. C. Lison and is being worked by the former.

Northeast 1000 feet from the Sultan is the Green Mountain mine (patented) belonging to the Tower estate, and with H. T. Andrews as administrator. This is a property of local reputation and is developed by a 40-foot shaft and several drifts. This mine has produced very high-grade ore in former years, but is not being worked now.

West of the Green Mountain a quarter of a mile are the Admiral and Buena Vista. The Admiral shaft is down 40 feet and shows a foot and a half of ore that averages \$20 to \$40 per ton in gold. The Buena Vista is a parallel vein with the Admiral, and is a very high-grade mine. Very little work has been done on this mine; a tunnel has been run in 20 feet and shows a six-inch streak of very high-grade ore running from \$100 to \$500 per ton in gold. These properties are owned by Ernest Arnez and Monrial; development work will commence on all these mines in two weeks. Mill tests at the Old Reliable mill of these properties have proven highly satisfactory, and several cars of gold bullion have been shipped through the house of Beshford & Barnister to the U. S. Mint, at San Francisco, from these mines.

THE JUMBO MINE.—Denver Record: Three tons of ore from the Jumbo mine, Rustler Camp, Arizona, were taken to the sampling works at Mojave last week and gave a result of 18 ounces of gold to the ton. The ledge from which the ore was taken is of good width and is one of the best veins in the district. The mine will at once be opened up in a systematic manner and a mill erected. From three and three-fourths pounds of picked rock from this mine there was obtained by the simple use of mortar and pan 6½ ounces of gold, worth \$17 per ounce.

NOTHING IN THE "GRANT SCARE."—The so-called "grant scare" is not bothering the miners and mine owners of Cochiti. The Santa Fe New Mexican asserts and defies successful contradiction, that all of the best mines in the Cochiti district are on Government land and that the so-called "grant scare" was gotten up by designing persons based upon selfish motives to extort a few paltry dollars from the enterprising miner.

COLORADO.

NEW STRIKES IN COCHITI DISTRICT.—Denver Republican: New strikes of ore running from \$32 to \$100 per ton are so frequent in the Cochiti district that they excite very little comment. Returns just at hand from Burlingame show \$700 ore in a new prospect in Cella canyon. In the Lone Star tunnel a rich vein of \$400 ore has been struck and when roasted it shows blisters of gold. That the principal mines run high in tellurium is now settled beyond all doubt. A fine body of mineral, similar to that in the Crown Point, has been uncovered in the Miners' Union claim in the west fork of Pino canyon, over a mile from the Crown Point. In Cochiti canyon the Little Colorado claim, owned by La Junta parties, reports a new strike, assay returns from which have come to hand from Pueblo. It yields \$41 in gold and \$85 in silver, making a total of \$126 to the ton. Near Bear canyon, ten miles south of Pino canyon, some fine ore is being extracted, and the ledge are similar to those in the Lone Star. One claim, which shows twelve feet of quartz, gives an assay return of one ounce in gold and 3½ ounces in silver. The same croppings are found near Borrego springs, and things are lively in that locality.

IDAHO.

POORMAN.—Avanache: The rich ore in the Belle Peck tunnel continues as good as reported last week. The south drift has softened up some and the pay streak is larger. No. 3 is being driven south in rich ore. The slopes continue rich and the ore-house is kept piled full, notwithstanding the steady running of the mill. They have ore in sight to run the present milling plant indefinitely.

TRADE DOLLAR.—The mine is looking fine at every point where work is being prosecuted. The face of the adit tunnel continues in good ore as progress is made into the mountain. This chert (north of the npraise) is in the Feour ground, recently acquired by the Trade Dollar Company, and has about 800 feet of "backs." Taken with the reserves in the original group, the production from this property is assured for years to come. Four bars of bullion were shipped out on the stage last Tuesday. Some first-class ore and concentrates have also been shipped lately.

OREGON.

Jacksonville Times: Phil Miller brought in 120 ounces of gold dust from the Miller placer mine in Farmer's flat on Wednesday. They have only just begun to clean up, and this gold was taken from a few boxes, leaving the greater number and all the bedrock to be cleaned yet. The output for the season will run close to \$10,000. Swinden & Hayes cleaned up \$1200 from an eight days' run lately on their Oscar Creek placer mine in Josephine county. The Homestake mine near Woodville is developing in a promising manner. A tunnel has been run to a depth of 270 feet, tapping the ledge about 200 feet from the surface. The lode is two feet wide in the face of the

tunnel and shows high-grade ore. Fred Maher has struck what looks like a bonanza between Thompson and Williams creeks, in the shape of a two-foot ledge of gold-bearing quartz, from which he has pounded out with a hand mortar from \$2 to \$20 to the pan. It is said to be no pocket, but a true fissure vein. Operations will be resumed on the old Hope ledge in the Wagon Creek district, now known as the Shorty, in a few days. An excellent mill has been put up there. The mill at the Mountain Lion mine on Missouri flat has been shut down for reasons unknown. The tunnel is now in 300 feet, and an inexhaustible supply of rich ore is said to be in sight.

EAGLE CREEK PLACERS.—Baker City Democrat: The interest manifested by Eastern capital for the past several months in the placer fields along Snake river is phenomenal, and thousands of acres along that stream have been located and machinery placed thereon to save the fine gold found in the bare and banks.

The tide of investment has been gradually working its way Oregonward and has at last developed in this vicinity.

A Duluth, Minnesota, company, represented by Messrs. Joseph McAfee and Frank Merritt, have located eight miles of Eagle creek, Union county, commencing at a point known as Sbanghi Falls, a few miles from Sperts, and running up stream. The enterprise is one of large proportions and will require the outlay of considerable money. Mr. McAfee estimates that upward of \$75,000 will be expended in machinery and in putting in a bedrock flume to work the mines.

It has been known for many years that the bed of Eagle creek contained gold in large quantity, but owing to the huge boulders to be encountered, the undertaking was too great for people possessed of limited capital. However, the bars of the stream have been worked at intervals with good success. The improvements in machinery in latter days has given an opportunity for all obstacles to be overcome.

MONTANA.

ELLISTON DISTRICT.—Anaconda Review: The Telegraph mine is one-half mile west of the Bullion mine, which is located at the head of Bryant gulch. It is a gold property, the ore being free at the surface, but at the depth of 30 feet it is telluride gold. There is a mill on this property, which was put up several years ago, but as the character of the ore changed and it became base, of course the mill ceased to be a success and has been idle since. The lead is an immense one, 46 feet wide. There are about 200 feet of shafts on the lead, and some 400 feet of tunnels run. There is an open cut from the mill stripped off from 32 to 50 feet from the face. The ore, like that of all similar mines is low grade, but there are some very rich spots in it. The mine has been bonded for a time, which may account for the property having been allowed to remain idle so long.

It is stated that the ore can be mined and placed in the mill for the exceedingly low sum of 28 cents per ton. The mine was discovered by tracing up the source of rich placer diggings that were in the gulch below, and in going up the hill a little higher the lead was encountered. The mine is the property of John Ashley & Co.

The Bullion mine is developed by a perpendicular shaft to a depth of 250 feet, and has been worked several years, the ore being treated at Remeni. The past year and a half it has not been worked, owing to the low price of silver. It is low grade, but there are large quantities of ore. The mine is owned by William Cranich and A. M. Holter.

The Ontario is a silver and gold proposition that is very much thought of in this district, and it is now being worked steadily. A new concentrator has been erected on this property, and it has proved a great success from the start. The concentrates are being shipped to Tacoma for smelting. The mine is considered a very valuable one.

On "Nigger hill," seven miles southeast of Elliston, there is also a very promising district.

The Mountain View is developed by a main tunnel in about 250 feet, and from this there is a 30-foot winze, below which there are fully 800 feet of tunnel work. The ore is mainly lead and silver, though it carries about \$4 in gold to the ton. The company has out on the dump about seven cars of ore ready for shipment. This mine is owned by Frank Taylor and William Budgeon.

The Bob Tail is another silver property, of somewhat higher grade than the Mountain View. It has one shaft that is down 35 feet, and another one 65 feet, with about 150 feet of tunnel work. The vein is about four feet thick. The percentage of gold is considerably higher than that of the mine previously mentioned. The owners are Tom Porter, Gne Thornton and Chas. Lindley.

The Big Dick is another exceedingly promising property. It is developed by a shaft down 150 feet, and a mill run from a car of ore realized \$100 to the ton for the fortunate owners, who are a stock company.

The Comstock is another paying institution. It is developed by a shaft down 106 feet. A mill run from this mine of a car of ore realized \$96 to the ton. This was handled at East Helena.

SOUTH DAKOTA.

THE CYANIDE PROCESS.—Deadwood Pioneer: The cyanide process, as handled by the Gold Recovery Company, of which J. S. Childs and Dr. Taylor are the heads, has been proven beyond a peradventure to be a great success. Yesterday's cleanup resulted in a bright yellow brick weighing 95 ounces, valued at \$1900. This brick was the product of 85 tons of ore from the company's property at Blacktail. The ore averaged \$25 per ton. This shows an extraction of a little over 90 per cent. It is one of the most satisfactory cleanups ever made at this plant. The cleanups made prior to the re-

jection of the Morrell pulverizer showed as high as 84 per cent by extraction. But now, since the plant has been fitted with finishing rolls in place of the pulverizer, the crushing of the ore has been gotten down to a science and the percentage of extraction has been increased and the working of the plant greatly facilitated. In cyanide the problem of treating the low-grade ores of the Hills has been found. Not that the process is cheaper than any other—we think it is, though, but in that it saves a higher percentage of the metal contained in the ores. In chlorination we understand the cost of reduction per ton is \$2.77 with an extraction of 75 per cent. Pyritic smelting costs per ton \$3, and as high as \$5, per ton, extraction 78 per cent. Free-milling ore reduction by stamp mills, 88 cents per ton, when handled in quantities such as the Homestake handles it, saving in extraction from 65 to 78 per cent; average saving, 68 per cent. Cyanide, cost of production per ton, \$3, per cent of extraction, 90. The success of the cyanide process shows its adaptability to the ores of this section. The ores which have been treated at this plant can be termed representative ores of this district, or at least the district covered by the blanket or flat formation, which is of a refractory and very rebellious nature, and heretofore only susceptible to the chlorination and smelting processes. The operations of the cyanide plant since its resumption have not been experimental runs—the days of experience being long passed by—but runs made with understanding that the process was a success and doing the work for which it was intended, as demonstrated by the experimental runs of long ago.

UTAH.

MINING MATTERS QUIET.—The past week has been another quiet one among the mines of Utah, says the Salt Lake Tribune. They are all working in a desultory way—in fact, they are just holding on. The silver mines are working and the owners are waiting for a better price for silver. The quotations of silver have been about the same all the week, the latest being 62½ cents.

There is still some activity among the gold camps, but little of special interest is going on.

A good many men are employed in doing development work at Mercen, and the claim-owners are as confident as ever that that district is destined to be one of the greatest gold-producers in the world.

There were no sales of Utah stocks reported on the New York Board last week.

Coast Industrial Notes.

—It is proposed to establish a State Ice manufactory at Folsom prison.

—The Great Northern is preparing to put a line of steamers on Puget Sound to compete with the Northern Pacific.

—The Royal City, B. C., Planing Mills were totally destroyed by fire last Saturday; loss \$100,000, insurance \$75,000.

—Representative English says he is confident that he will succeed in his efforts to secure a duty of five cents per pound on quicksilver.

—The South Bend, Wash., Sawmill has been purchased by John S. Harris, a representative of the Weyerhaeuser syndicate of Wisconsin and Minnesota.

—The Tacoma Match Works recently shipped two carloads of Tacoma-made parlor matches to Chicago. No other parlor matches are made west of the Mississippi.

—The last wheat cargo of the season has gone to Europe. The sworn value was the unprecedented figure of 54 cents a bushel—90 cents a cental—something before unheard of in California.

—The present relation between supply and demand in the lumber business is exemplified by the fact that while the 250 shingle mills in the Northwest have a combined cutting capacity of 18,000,000 shingles daily, the average present monthly shipments do not exceed 100,000,000.

—The new cruiser Olympia, being built by the Union Iron Works, is nearly finished, and is now lying alongside the company's docks waiting her battery. The turrets are as yet unarmored, but it is thought the delay will be but temporary. That is something that rests between the Government and the Eastern firm that furnishes the plates. The vessel is a splendid advertisement of the skill and enterprise of its California builders.

—Fish Commissioner Crawford of Washington has furnished the following statistics of the fishing industry of the State: Fishermen were paid by Washington canneries five cents a pound for salmon; the catch amounted to 6,721,435 pounds. They also sold to Oregon canneries to the value of \$150,000. The value of the spring pack of the Washington canneries for 1893 was \$790,432, and of the fall pack, \$35,000. The amount received by Washington fishermen on the Columbia river for 1893 was \$626,071. The sturgeon catch was valued at \$52,635. The Gray's and Willapa harbor fishermen were paid \$23,439 by the canneries and sold elsewhere salmon to the amount of \$11,000. The value of the salmon pack in the Puget Sound district for the same time was \$269,000.

The Advantages of an Earth Battery.

In view of the dangers which threaten the city through the destruction of the gas and water mains caused by electrolysis, a recent practical test of the relative strength and durability of the ordinary cell battery and Professor Michael Emme's Ground Generator is especially interesting. One of Professor Emme's generators was placed in a vacant lot on Sacramento street, near Prof. Price's laboratory, on the 16th inst., beside a cell battery of equal power—½-horse power—and each was connected by wires with electrical instruments located in Prof. Price's office, upon which the tests were made. Prof. Price has kept a careful record—reading the instruments each hour during the day—of the exact amount of electromotive force produced by the ground generator in comparison with the cell battery. This test was deemed necessary because of the assertion, frequently made, that the earth exerts no real influence upon the Emme generator—that if the zinc and carbon plates were put into ordinary cells, in an acid solution, the result would be the same. This assertion has been disproved in a signally convincing manner. While the ground generator is still developing its full force of ½-horse power, or 93 watts, the cell battery began to fail within two hours after both were started, and within 24 hours was giving but four watts—barely energy enough to turn a small motor. In six days the cell battery was exhausted, and had to be replenished and repaired three times—120 gallons of depolarizing and exciting fluid producing full power for but three hours. The cell battery is now dead, while the ground generator is as active as at the beginning of the test.

Up to this time the latter has required but 18 gallons of depolarizing and five gallons of exciting solutions, and no stoppage for repairs or from any other cause has been necessary. In other words, the ground battery continues, and will continue to run steadily, with full power, until the zinc plates are entirely consumed, but a few minutes' attention each day being required for it. Though the same number of zinc plates are used in each, with a difference of but 8½ pounds' weight in favor of the generator, the latter occupies but one-third the space required for the cell battery. Professor Price has made two other tests, viz.: electro-metallurgical deposition of copper as compared with a dynamo, and also a comparison of electric lighting between the two systems. The result of these experiments showed, when the zincs were weighed this morning, that the Ground Generator lost 4½ pounds of zinc in ten days' constant running day and night, against 88½ pounds in the cell battery.

These and the tests above mentioned, which have been carefully watched by numbers of practical men—electricians and others—should be conclusive (really they are so) as to the relative merits of the cell battery and the ground generator, forever setting at rest all doubts as to the efficiency and economy of the latter.

It is of interest just now to know that Professor Emme has discovered that electric currents can be transmitted through a naked copper wire placed under ground, dry or wet, without what electricians call dissipation of electricity, and without loss except ohmic resistance of wire and lead. Professor Emme claims that the two wires, positive and negative, will be perfectly protected from electrical action between them, and that no green oxide of copper will form on the positive wire. He has had similar wires under the ground fourteen months, and they are still in perfect condition. This discovery will enable the use of an underground system of transmitting electricity for electric railways, and thus obviate the dangers that now threaten gas and water pipes, while doing away with the unsightly and dangerous trolley system. The ground generator system may be seen daily at 524 Sacramento street.—S. F. Report, May 26th.

Market Reports.

The Markets.

SAN FRANCISCO, May 31, 1894.

But little movement was observable during the week, silver remaining about the same.

New York Prices.

NEW YORK, May 31.—Following are the closing prices for the week:

Silver io				
London.	N. Y.	Copper.	Lead.	Tin.
Thursday.....	28 1/4	61 1/4	.....	.....
Friday.....	28 1/4	62 1/4	9 5/8	3 2/8 19 5/8
Saturday.....	28 1/4	62 1/4	9 4/8	3 2/8 19 5/8
Monday.....	28 1/4	62 1/4	.....	.....
Tuesday.....	28 1/4	62 1/4	9 5/8	3 2/8 19 5/8
Wednesday.....	28 1/4	62 1/4	.....	.....

The local bullion, money and exchange quotations current are as follows:

Commercial Loans, per cent per annum.....	7@8
Commercial Loans, prime.....	6@9
Call Loans, gilt-edged.....	7@8
Call Loans, mixed securities.....	7@8
Mortgages, prime, taxes paid by lender.....	7
New York Sight Draft.....	inc
New York Telegraphic Transfer.....	12 1/2 c
London Bankers', 60 days.....	\$4.88
London Merchants'.....	\$4.86 1/2
London Sight Bankers'.....	\$4.89 1/2
Refined Silver, per ounce.....	62 1/4
Mexican Dollars, nominal.....	50 1/2 @ 51 1/4

San Francisco Metal and Coal Market.

ANTIMONY. QUICKSILVER.

Per lb..... @ 12 1/2 Home trade, pr. 35 50 @ 35 75

BORAX. STEEL.

Refined, in car lots @ 7 1/2 English, do..... @ 20

Powdered, do..... @ 7 1/2 Canton tool..... @ 18

Concentrated do..... @ 7 1/2 S. K. Diamond tool..... @ 18

All grades jobbing at advance..... @ 18 Pick & Hammer..... @ 10

COOPER. MACHINERY.

Bolt..... 23 @ 10 Toe Oalk..... @ 4

Shoeing, Johning..... @ 20 Pig TIN..... @ 22

Dog, wholesale..... 15 @ 20 Spot @ 21 1/2 @ 44

IRON. COAL.

Bar, base..... @ 2 Spot from yard—PER TON..... 83 00

Norway, base..... @ 4 1/2 Wellington..... 83 00

PIO IRON. Spot.

Eglington ton..... 23 50 @ 50 Gila..... 5 75

Clematuck..... 22 50 @ 50 Seattle..... 5 50

Am. Bolt, No. 1..... @ 50 Coos Bay..... 5 00

Shots No. 1..... 22 50 @ 50 Cannel..... 8 75

Pugst Sound..... @ 50 Egg, hard..... 11 75

Clay Lane White..... 22 50 @ 50 Wallend..... 7 75

Langdon..... 22 50 @ 50 Scotch Splint..... 7 50

Gastherrie..... 22 50 @ 50 Brynbo..... 7 25

Barrow..... 22 50 @ 50 West Hartley..... 7 25

Cargoduck..... @ 50 TO LOAD—PER TON.....

Drop, sizes smaller than..... @ 50 Australian..... 6 25

Do do, Bag larger sizes..... @ 50 Liverpool Steam..... 6 50

Do do, Bag of 25 lb..... 2 10 English, to load..... 9 00 @ 9 50

Do do, Bag of 25 lb..... 2 10 Do, spot, in bulk..... @ 11 50

Do do, Bag of 25 lb..... 2 10 On, in sacks..... @ 13 50

Do do, Bag of 25 lb..... 2 10 Cumberland..... 9 00 @ 9 50

Mining Share Market.

SAN FRANCISCO, May 31, 1894.

Memorial day holiday made some difference in this week's market, and the absence of definite news from the present center of interest—the 1650-foot level of the Con. Va.—contributed to quietness. There was a little stir in Gould & Curry, but everything was played with a very light limit.

The following illustrates the changes of the week:

MINES.			24	31
Utah.....	\$ 15 1/8	8		
Sierra Nevada.....	1 15	1 00		
Union.....	86	76		
Mexican.....	1 80	1 35		
Ophir.....	3 90	8 15		
Consolidated California and Virginia.....	5 75	5 1/4		
Best & Belcher.....	1 70	1 80		
Gould & Curry.....	98	1 10		
Savage.....	75	70		
Hale & Norcross.....	70	60		
Chollar.....	66	60		
Potosi.....	1 10	1 00		
Bullion.....	33	80		
Exchequer.....	7	7		
Alpha.....	7	7		
Confidence.....	7	7		
Yellow Jacket.....	95	1 05		
Crown Point.....	1 85	1 30		
Overman.....	28	25		
Justice.....	23	20		
Alta Consolidated.....	83	80		
Consolidated New York.....	6	6		
Challenge.....	1 50	1 40		
Bodie.....	70	68		
Andes.....	1 50	1 40		

Board Sales of Mining Stocks.

S. F. Stock Board.

THURSDAY, May 31, 1894.

9:30 A. M. SESSION.

100 Andes.....	53 1/2	150 H & N.....	50c
400 Belcher.....	1 30	300 Justice.....	57c
100.....	1 25	200 Mexican.....	1 80
100 Bodie.....	1 40	200 Justice.....	20c
100 Best & Belcher.....	1 70	200 Mexican.....	1 30
100.....	1 75	1500 Mexican.....	1 30
200.....	1 80	400.....	1 35
200 Bullion.....	30c	1000 Ophir.....	3 15
1500 Bulwer.....	12c	500.....	3 10
50 Challenge.....	20c	300 Potosi.....	1 00
200 Chollar.....	5c	300 Savage.....	70c
1800 C. C. & Va.....	5 00	250 Sierra Nevada.....	1 00
525.....	5 12 1/2	100 Union.....	75c
850 Crown Point.....	1 05	100 Utah.....	80c
650 G & C.....	1 10	200 Yellow Jacket.....	90c

2:30 P. M. SESSION.

950 Andes.....	53c	700 H & N.....	55c
500 B & B.....	1 65	100 Justice.....	18c
100.....	1 30	100 Mexican.....	1 70
100 Bodie.....	1 30	200 Justice.....	4c
300 Bullion.....	30c	100 Ophir.....	2 30
300 Bodie.....	1 25	150 Mexican.....	2 85
400 Bulwer.....	11c	1000 Mexican.....	1 25
100.....	12c	300 Overman.....	25c
50 Challenge.....	20c	300 Potosi.....	1 00
100 Challenge.....	55c	100 Savage.....	73c
200.....	55c	100.....	72c
450 Crown Point.....	1 00	250 Sierra Nevada.....	90c
300.....	1 05	100 Seg Belcher.....	1 00
830 Con. Cal. & Va.....	4 35	400 S. Hill.....	3c
200.....	4 30	100 Union.....	75c
600.....	5 00	100 Yellow Jacket.....	85c
200 G & C.....	1 10	100.....	85c
600.....	1 05	.....	85c

Archibald Forbes' Battle Picture from the Next Great War.

Let me briefly adumbrate the possibilities—indeed, I may say the probabilities—of the results of a great battle in the next great war, which is sure to be "short, sharp and decisive." The fighting has been prolonged and bloody, with the result that one side is definitely beaten, evacuates its positions and retreats more or less precipitately, leaving on the ground its wounded, none of whom could be cared for while the conflict lasted. The successful commander's ground is littered with his own wounded; he has them on his hands in thousands, and he has also on his hands the thousands of the wounded of the vanquished force which has gone away. The conqueror of the future, if he accepts the old-time conventional burden of his adversary's wounded, will become its victim. He will not accept the incubus. Is it to be imagined that the victor in such circumstances will think twice even about his own wounded, let alone the wounded of the other side? No. He is in the field, not to be a hospital nurse, but to follow up his advantage by hammering on the enemy who has departed, leaving his own wounded behind, and who may come back again to-morrow to strike him while clogged in the live and dead debris of yesterday's battle. The victor will hasten away to overtake or hang on the skirts of the vanquished army, leaving the wounded of both sides to be dealt with as may be possible by such surgeons as he can afford, in view of future contingencies, to leave behind, and to the ministrations of cosmopolitan amateur philanthropists of the Red Cross and kindred organizations. For there will be no more military hearer companies; in the hunger for fighting men, the 1000 hearers per army corps of the present will have been incorporated into a strong brigade with arms in their hands and a place in the fighting line.—Scribner's.

Patents Issued to Pacific Coast Inventors.

Reported by Dewey & Co., Pioneer Patent Solicitors for Pacific Coast, 220 Market Street.

FOR WEEK ENDING MAY 22, 1894.

520,202—STEP LADDER—G. E. Chittenden, Niles, Cal.
 520,204—UNCOOPERABLE AND BRAKE—J. P. Diaz, S. F.
 520,213—REVERSING GEAR—G. E. Hoyt, S. F.
 520,164—ANIMAL ORG—C. E. Lande, La Grande, Or.
 520,117—OATS LATCH—J. M. Mathews, Seattle, Wash.
 520,372—BUNG AND BUSHING—G. H. Merrick, S. F.
 520,329—BUSHING AND FAULT—G. H. Merrick, S. F.
 520,240—BUSHING FOR BARRELS—G. H. Merrick, S. F.
 520,390—BOOT FOR STAMPS—A. F. Purdy, Laurens, Cal.
 520,220—CORES, ETC.—P. W. Reardon, Oakland, Cal.
 520,222—GUIDE FOR DISCHARGE NOZZLES—C. F. Rodin, S. F.

520,083—TELEPHONE SYSTEM—Fabin & Hampton, S. F.
 520,231—ELECTRIC ADVERTISING APPARATUS—G. L. Schneider, S. F.
 520,224—BEER PRESSURE APPARATUS—R. S. Schroeder, S. F.

520,342—SWIMMING POOL—A. Sutro, S. F.
 520,096—LIMBING INDEX—T. A. Urcu, Pineville, Or.
 520,231—STICK MILL FLOW—G. Willard, Los Angeles, Cal.
 520,199—TRACK FOR DOORS, ETC.—G. E. Witt, Fresno, Cal.
 520,348—FIRE ALARM—E. A. Wright, Monrovia, Cal.
 520,234—DESIGN FOR PICTURE FRAME—W. F. Lamhart, Millbrae, Cal.

NOTE.—Copies of U. S. and Foreign patents furnished by Dewey & Co. in the shortest time possible (by mail or telegraphic order). American and Foreign patents obtained, and general patent business for Pacific Coast inventors transacted with perfect security, at reasonable rates, and in the shortest possible time.

—Organization has been completed of the Portland, Vancouver and Northern Railway Company, with a capital of \$3,000,000, to build a road from Portland to the Northern Pacific at North Yakima.

Sampling Works for Sale.

The works are situated at Daggett, Cal., in the Calico Mining District, and on side track of the Atlantic & Pacific Railroad. They contain a first-class 50-horsepower engine and 45-horsepower boiler, with Ore-crusher and other machinery, Mill Scales, Assaying outfit, etc., all newly new. Also upon the premises an office building and a comfortable dwelling-house (portable). The above can be had at a bargain. Apply to JOHN H. GILLESPIE, 1214 Stockton St., San Francisco.

20-Stamp Mill for Sale.

In Southern California, a 20-stamp Gold Quartz Mill, with engine, boiler, self-feeders, rock-breaker, etc. As the premises are adjacent to Railroad, the Mill could be conveniently removed. Can be had at low price for cash. Address: "Quartz Mill," care MINING AND SCIENTIFIC PRESS, San Francisco.

PRACTICAL TREATISE ON HYDRAULIC MINING.

By AUG. J. BOWIE, JR.

This new and important book is on the use and construction of Ditches, Flumes, Dams, Pipes, Flow of Water on Heavy Grades, methods of mining shallow and deep places, history and development of mines, records of gold washing, mechanical appliances, such as nozzles, hardy-gurds, rockers, undercurrents, etc.; also describes methods of blasting; tunnels and sluices; tailings and duty of miners; inch, etc. A very practical work for gold miners and users of water. Price, \$5, post-paid. For Sale by DEWEY PUBLISHING CO., 220 Market St., San Francisco, Cal.

MINING SHAREHOLDERS' DIRECTORY.

COMPILED EVERY THURSDAY FROM ADVERTISEMENTS IN THE MINING AND SCIENTIFIC PRESS AND OTHER S. F. JOURNALS

ASSESSMENTS.

COMPANY AND LOCATION.	No.	AMT.	LEVIED, DELINQ. AND SALE.	SECRETARY.
A. & H. M. Co., California.....	15	20	May 3, June 11, July 2	F. M. Husted, 530 California
Alta M. Co., Nev.....	100	100	May 14, June 19, July 19	J. E. Jacobus, 308 Montgomery
Best & Belcher M. Co., Nevada.....	86	250	April 30, June 5, June 25	L. Oshoro, 303 Montgomery
Bulwer Cons. M. Co., Cal.....	9	100	May 24, June 23, July 27	L. Osborn, 303 Montgomery
Clinton Cons. M. Co., Cal.....	4	500	April 4, May 14, June 2	O. E. Gunn, Mills Bld'g
Con. New York M. Co., Nev.....	12	50	May 11, June 19, July 12	E. Elliott, 303 Montgomery
Coos St. Coalhard M. Co., Cal.....	9	65	May 17, June 21, July 9	F. Holling, 115 Crocker Bldg
Crown Point G. & S. M. Co., Nev.....	61	250	April 23, May 28, June 18	Jas Newlands, Mills Building
East Sierra Nevada M. Co., Nevada.....	3	50	Jan 10, May 18, June 8	Geo R. Splinney, 310 Pine
Empire Mining Co., Cal.....	8	30	April 11, May 12, June 2	Otto tim Sudeh, 215 Bush
Golden Prize M. Co., Nev.....	0	250	April 23, May 28, June 23	O. D. Bennett
Gray Eagle M. Co., Cal.....	30	30	April 20, May 29, June 19	C. C. Harvey, 303 Montgomery
Hale & Norcross M. Co., Nevada.....	105	250	May 1, June 5, June 23	A. B. Thompson, 309 Montgomery
Hazard C. M. Co., California.....	4	250	April 28, June 1, June 18	O. E. Kelly, 213 Sansome
Kentucky Cons. M. Co., Cal.....	9	100	May 3, June 14, July 3	Aug Waterman, 303 Montgomery
Ophir M. Co., Nevada.....	32	250	May 4, June 5, June 25	E. B. Holmes, 303 Montgomery
Plus Hill G. & S. M. Co., Cal.....	4	50	April 13, May 19, June 3	C. A. Hare, Pier 5
Silver King M. Co., Arizona.....	10	200	May 2, June 11, July 9	J. W. Pew, 310 Pine
S. Eureka M. Co., California.....	11	10	May 15, June 25, July 15	A. Halsey, 328 Montgomery

MEETINGS.

COMPANY AND LOCATION.	MEETING.	SECRETARY AND OFFICE IN S. F.	DATE.
Alaska-Treadwell G. M. Co., Alaska.....	Annual	A. T. Corbus, Mills Building	June 20
Crown Point M. Co., Nevada.....	Annual	Jas Newlands, Mills Building	June 4
Factollar G. M. Co., Nevada.....	Special	C. A. McLane	June 4
Seg Bolcher M. Co., Nevada.....	Annual	A. B. Thompson	June 4
Valenzuela C. M. Co., Nevada.....	Annual	A. E. Ball, 431 Cal.	June 1

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Table of Contents.

The following brief abstract of the contents will give an idea of the branches of the subject treated:
 General Plan; Discussion of the Principles of Hydraulics; Rules Deduced from Formulae; Oblique; Examples and Calculations; Extensive Tables for Ready Reference; Fundamental Laws of Hydraulics Demonstrated and Expressed in Formulae and Rules; Flow of Water through Opening; Weir Coefficients; Triangular Weirs; Flow of Water Over Quadrant Weir (tabulated); Application of Tables; Submerged Orifices; Flow through Orifices in Thin Partitions; Tables and Applications; Miners' Inches; Tables and Calculations; Flow of Water through Short Tubes and Compound Tubes; Flow of Water through Pipes; Table of Velocities and Cubic Feet Flow for Given Fall per Mile and Diameter of Pipe; Coefficient for Bend-Circular and Angular; Flow through Nozzles; Inverted Siphons; Flow of Water in Open Channels; Extensive Tables; Rough and Ready Notes; Hints for Speedy and Approximate Estimates, etc.
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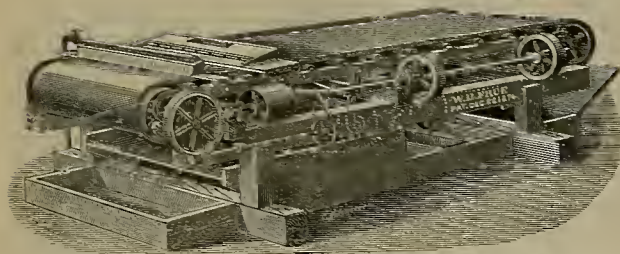
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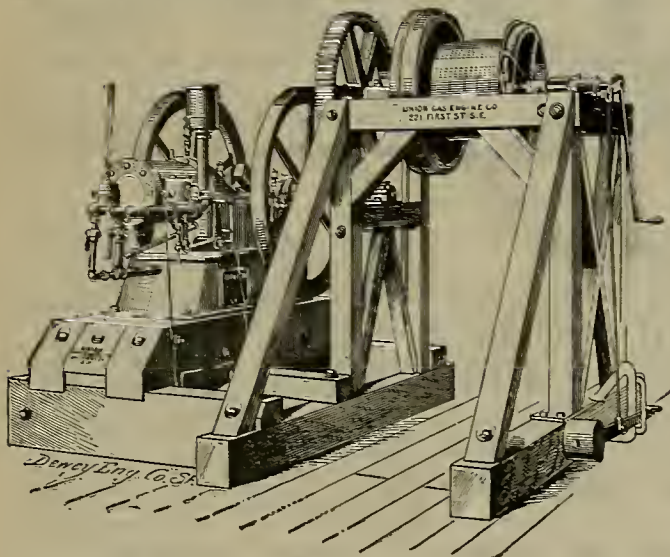
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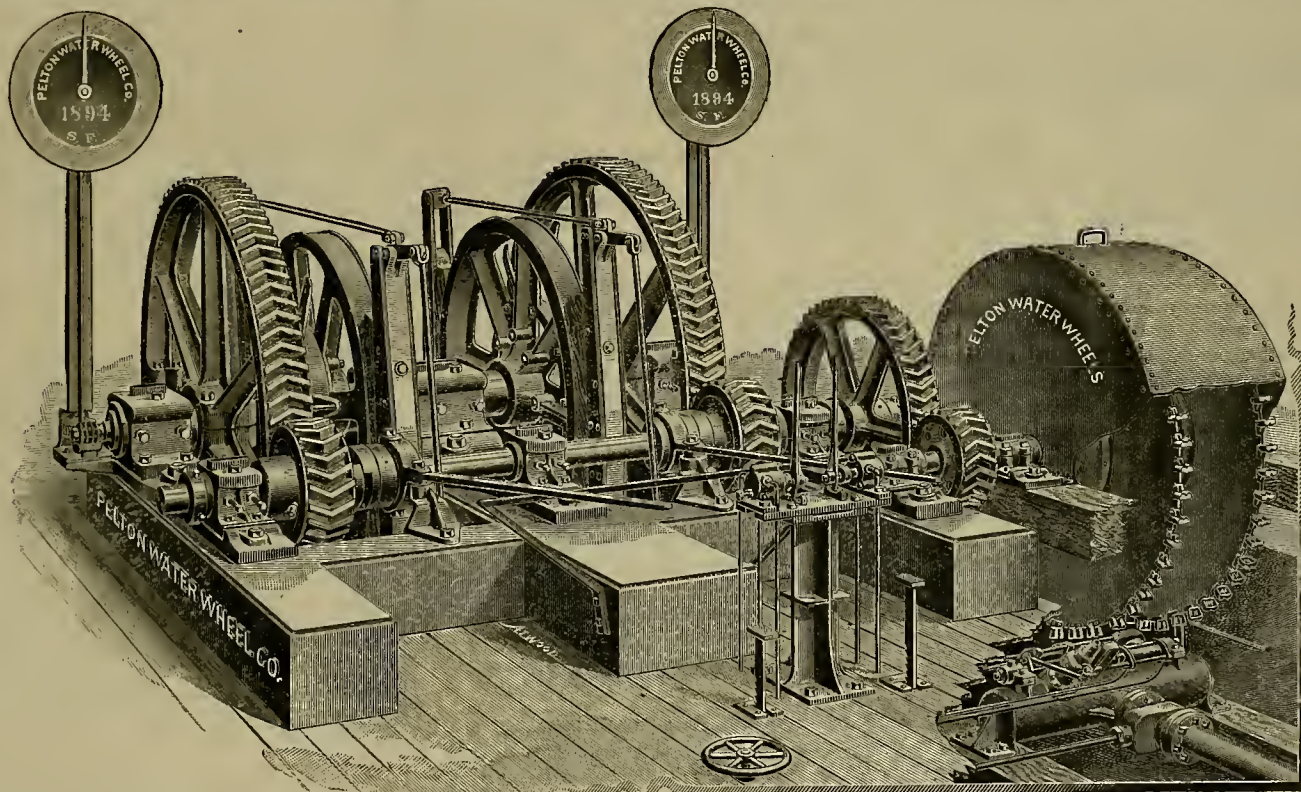
Pelton Water Power Hoist.

The illustration herewith shows a water-power hoist of recent and modern construction, embracing all the safety appliances and improvements in this class of machinery. The design presented is a flat-rope double-reel hoist for a two-compartment shaft, recently built by the Pelton Water Wheel Co. for the Milwaukee mine in the Cœur d'Alene district, Idaho.

The wheels are six feet in diameter, made of solid steel discs with phosphor bronze buckets, and run under 850

work to a depth of 1000 to 1500 feet. The gearing can be arranged to increase the speed to 600 feet per minute if desired. A three-fourths inch stream under head named gives each wheel a capacity of 70-horse power and a one-inch stream 120-horse power. Similar hoists with reels for both flat and round rope have been furnished by the Pelton Company to many of the most prominent mines on the coast, some working to a depth of more than 2000 feet. The wheels and appliances connected therewith, constituting the power part of the plant above described, weigh only 2800 pounds, thus indicating the great advantage of water

THE prevalent dullness has had no apparent effect on the sharpeners who prey on honest industry. Just at present inventors seem to be considered as good game to go after. The latest is for some "patent firm" in Chicago, for instance, to secure the names and addresses of people taking out patents, and write, telling the inventor or assignee that he has a "good thing," and that in all probability the patent could be traded for a farm in Iowa, incidentally mentioning that it would cost \$25 "to examine the title." Farms in Iowa are good things, if big enough and fertile enough, but it transpires, very singularly, too, that in



PELTON WATER POWER HOIST.

feet head at 375 revolutions, which gives the wheels a peripheral velocity of 6800 feet per minute. Water is applied to the wheels through nozzles, the gates of which are controlled by hydraulic valves operated by levers at the engineer's stand. An air receiver is located at the lower end of the pipe to prevent a shock to the line by a sudden closing of the gate. The nozzles are provided with deflectors operated by levers which give the engineer control of the wheels independent of any movement of the gates, admitting of their being stopped instantly in case of accident.

The hoist is equipped with powerful post brakes operated by foot treadles, which afford absolute security in stopping or lowering the cages, and give perfect control of the movement at all points in the shaft, while to afford additional security the wheels may be instantly reversed without shock or injury by applying the stream in an opposite direction. The reels are mounted on separate shafts and connected by gearing and clutches on pinion shaft so that they may be operated together or independently, as may be desired.

The hoist here referred to is designed for carrying a load of 5500 pounds at a speed of 400 feet per minute and

power whereby any reasonable means it can be made available.

It is certainly true, says *Iron and Trade Review*, that the manufacturers who have pushed hardest for business in the months of depression are the ones who have had most to do. On the other hand, those who have made little effort to get orders, on the assumption that "nobody has any money to buy anything with anyhow," as we have heard some lackadaisical people put it, have been taken at their word. If it is true in any line of activity that "all things come to him who waits," the aphorism has no truthful foundation in the world of business.

THE following homely bit of good advice to Arizonians is from the *Prescott Courier*: "A prospect is not a mine; it is just as reasonable to demand \$50,000 from an intending purchaser for an unborn blooded colt as to ask him \$50,000 for a little hen-scratching on the surface of the ground which may give birth to a mine, if the mine don't 'die a-bornin'.' Be reasonable, gentlemen; money is scarce, and many of you who would not sell for less than half a million could not count that sum of money if you were going to be hung."

every case where the \$25 was sent, the title to the farm was, somehow, defective, and the money was lost. 'Tis reported the men who worked this scheme have made \$30,000 out of it. Of course, publicity is fatal to such frauds, and their occupation will soon be gone.

AMONG other industries in this city is the sale, principally to Chinamen, of Mexican dollars, freshly coined, at fifty-two cents each. The dollars are good in China. It is a transaction in which, ultimately, the country loses forty-eight cents. The conditions that make such trade profitable or possible are in opposition to our country's interests. In this general loss lies largely the reason for existing depression. Upon the correct solution of the problem depends largely the return of healthy financial conditions.

STATISTICS of issuance of patents give suggestive comparisons. In '92, 2122 patents were granted to residents of Massachusetts; 49 to residents of South Carolina; 3907 to citizens of New York; 3 to Wyoming; in Connecticut one patent was received to every 1018 people; in Mississippi, one to every 20,000; in California, one to every 1900; in North Carolina, one to 21,000; in Illinois, one to 1900.

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San Francisco, June 9, 1894.

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COUNTERFEIT American silver dollars are now being made in Mexico, sent to England in payment for British exports to Mexico, and, it is said, thence shipped by English merchants to this country, where they are circulated at 100 cents. The thing is possible: more difficult things have been done.

The *Industrial World* is worrying itself about what it calls "the fresh gold mining craze." There is nothing fresh about it nor nothing crazy. The impetus is toward an industry that is never overcrowded, that is always sure of a good market for its product, that cannot suffer by competition nor depreciate in value. That is all there is to it, and it is as natural as the instinct of thirsty men for a drink.

It is considered certain that in less than a hundred days electric power generated at Niagara Falls will be delivered in Buffalo, N. Y. The current will be raised at the tunnel to a potential approximating 30,000 volts and carried to Buffalo by underground wires, where its potential will be reduced and operate motor dynamos at a cost, it is said, of two-thirds the present cost of steam power.

CARSON, NEV., fears that it will lose the mint and that that government institution will be removed to Denver. Director Preston favors such action and also favors certain modifications regarding the Philadelphia mint. Waiving all discussion of the matter, it is manifest that the protest that will go up from Pennsylvania regarding the Philadelphia mint will block the movement, and, incidentally, discount all probability of the removal of the mint from the Nevada capital.

THE question of what constitutes "raw material" is an important one to the firm of O'Connell & Lewis of this city. They secured a contract to build a dome on the New City Hall for \$249,000, it being expressly agreed that all material used must be of California manufacture. Were Eastern material allowed the contract could be made for about \$20,000 less. The city's architect and superintendent of construction, discovering that the steel blooms used by the Judson Iron Works in Oakland were shipped from the Carnegie works in Pennsylvania, refused to accept any work containing the Pennsylvania material. The contractors say that the article is "raw material," and not a manufactured article. The City Hall Commission deny the claim. By strict construction of the terms of the contract, the firm will have to discard the Pennsylvania article. The exact status of "raw material" is sometimes a hard question to satisfactorily decide, so much depending on the point of view as well as the facts. For instance, a woolen manufacturer claims that wool is "raw material," while the man who raised the sheep and sheared the fleece claims that it is a finished product.

Half a Loaf.

At present writing the tariff bill in the Senate reduces the duty on lead from \$30 a ton to \$15—just one-half. As originally reported from the House, lead was on the free list. Under the McKinley bill, foreign lead in pigs or ores was taxed one and one-half cents per pound. That enabled mine-owners to pay at least two dollars a day. Evidently the House of Representatives thought this was too much for an American miner to get, so, to give the Mexican two-bits-a-day laborer a chance, lead was made free. This, of course, would shut down every lead-producing mine in the Union. Folly could no further go. A glimmer of sense in the Senate has put the duty back at half the former rates. A full understanding of the requirements of the situation would put the duty at the old figures—thirty dollars a ton. It is unfortunate that the mining industries of this country and the very lives of the men engaged in mining should be thus made the sport and football of men who accidentally find themselves in a position to put American workmen on a level with Mexican peons. The whole thing is a badly mixed mess, and no one in or out of Congress can tell what the result of all this costly folly will be. When the Senate does finally get to a vote, in the event the bill in its present shape passes, it will go back to the House and be again an opportunity for further demonstration of the fact that the only reason sundry misfits in the lower house do not make fools of themselves is that Nature denied them the opportunity.

Not a Good Proposition.

As the Midwinter Fair draws to a close, the question arises, "What shall be done with the buildings?" The Executive Committee are under agreement with the Park Commissioners to destroy and remove all the buildings immediately after the fair closes, but some of them, especially the Administration and Fine Arts buildings, could well be retained. Their solidity and beauty justify their retention.

In this regard it has been suggested that the California State Mining Exhibit, now located in Pioneer Hall, on Fourth below Market street, be transferred to the Fine Art Building. To the MINING AND SCIENTIFIC PRESS it would seem to be a great mistake to think of such a thing. The present location of the exhibit is not the best; there are many and valid objections to having it where it is; but to move it away out to so remote a suburb of the city would be to greatly destroy its usefulness. The value of such an exhibit rests largely on its convenience of access. It ought to be as near the center of the city as possible; close to the hotels, near where mining men mostly congregate, and to relegate it to a lonely nook in the park would be a mistake. If any move is made it should be to put the exhibit in a more central location than at present. It is to be hoped that the suggestion of the Executive Committee will be negated. The motive is evidently kindly and the proffer is courteously made, but the best interests of the exhibit and all it represents suggest that the offer be declined.

The Nicaragua Canal.

At the meeting of the Pacific Coast Technical Society on the 1st inst., Wm. Sherwood read a paper on the Nicaragua Canal. He was one of the assistant engineers on the ground, and has a personal and practical knowledge of the matter. According to Mr. Sherwood's statements, matters are in a bad way. He said that there are difficulties and objections not understood by any one who has not visited the locality. The heavy rains, the swampy land, the dilapidated condition of the machinery, the unhealthy climate, the scarcity of labor, the lack of construction material, make the feasibility of the undertaking very doubtful, according to Mr. Sherwood. His remarks indicated that he was actuated more from a desire to state facts of which he was personally cognizant than to create any adverse feeling for interested motives. He drew a very gloomy picture of the enterprise in its present condition, very discouraging to all well-wishers of the enterprise.

The fact that Mr. Sherwood had been engaged as civil engineer there, and was stationed there some time with ample opportunity for impartial observation gives value to his assertions.

It is to be hoped, however, that the picture is overdrawn. The canal is a necessity to the interests of the Pacific Coast, and, with the indomitable spirit of American enterprise, the greater the obstacle the greater the incentive to overcome it.

Every railroad interest in the country opposes the canal, thus constituting a very formidable menace to the enterprise, but paramount to all that are the interests of the

nation, which are closely allied with successful prosecution of work on that great waterway.

Lieut. Menocal of the U. S. N. has been before the House Commerce Committee this week in an endeavor to push the proposition. He thinks the work can be done for \$60,000,000, and that it could be completed in six years.

T. S. Atkins, the New York receiver of the Nicaragua Canal and Construction Company, sold at public auction last Tuesday all the property and assets of the company for \$297,625.

Better at Home.

Probably few who are going, or thinking of going, to South Africa realize the fact that there is a thousand times more gold in California than was ever taken out. The only advantage, if advantage it may be called, that South Africa has is that it is comparatively a new country. But California is, in one sense, an undeveloped country: as undeveloped as South Africa. Were California just discovered there would be a "rush" to the Sierras and the foothills, for, as a rule, the less that is known of a region the greater the excitement. Fancy takes the place of fact.

Without assuming to decry other localities near or far, it is a demonstrable fact that California's contribution to the world's treasure has been only what was picked from the surface. The storehouse itself has scarcely been unlocked.

This is not written in depreciation of the spirit of adventure that impels energetic men to go to fields afar—the farther the more inviting. They will mostly return wiser, and it is hoped richer. It is said simply to assert what is not widely understood—that from one end of this State to the other lies a vast deposit of gold, as yet only scratched a little on the surface. The crude appliances of the early days, clever inventions born of necessity and new conditions, are being supplanted by scientifically constructed machinery, and while that which was easiest reached is not by any means exhausted, the deeper gravel deposits and the quartz ledges will, under the new and improved methods, yield rich return for ages to come.

Mining, like other things, is becoming systematized; it is now being put in business form, and invites the attention of dividend-desiring capital the same as any other legitimate, safely conducted business.

Since the above was in type the following appears in the *Bulletin* of this city, which bears on the same general subject:

"We make a mistake in going to England for mining capital," said W. S. Chapman to-day in talking about gold mining in California. He has had many years of experience as a mining man, and is thoroughly acquainted with the mineral districts of the State.

"Yes," continued Mr. Chapman, "our own people should be the ones to develop our mines. If foreign capital is put in, foreigners are going to get the profits. Mining in California is to-day the best and most profitable business in the world when systematically conducted by men who understand it. But not every man makes a good manager of mines. It takes much experience and sound judgment."

"Do I think gold mining is likely to increase in California? Most assuredly. There is much talk about the African gold fields just now, but let me tell you that in California we have the best and most extensive gold fields in the world. Most of our old mines that were once thought to be worked out are in reality undeveloped and may yet produce handsomely. In the past eighteen months Mr. Hayward has opened up five such mines that are paying well. Do you know that the Ulica mine, in Calaveras, the principal gold producer in the State, was some years ago sold for \$1000, the owners believing it was worked out? And now it is valued at not less than \$3,000,000. They are down only about 500 feet in that mine, and it probably has a great future."

"I could mention many such instances. In the early days mines were often abandoned when the water level was reached or the water troublesome to handle, or when a pay chute was worked out. The expense of working was vastly great in those times, and there was lack of the improved machinery and facilities for developing power and draining mines that are now at our disposal."

"The great mother lode, or productive zone or belt, running along the western slope of the Sierra Nevada, from end to end of the State, and into Mexico, abounds in mines that are yet to be opened. It has scarcely yet been prospected. And in the deep gravel deposits, likewise, there are untold millions in gold that will not be exhausted for centuries to come. Gold mining in California is still in its infancy."

"Do you believe in the theory that the deep gravel deposits lie in the channels of ancient rivers?"

"I do not. The theory does not fit all the facts. Take, for instance, the Thistle drift mine on the Gibsonville ridge, in Sierra county. A Scotch company has been profitably working that mine for several years. The gold is found in coarse gravel and boulders on the bedrock, in a channel hundreds of feet wide, and with a fall of seven feet to the hundred. The ancient deposit is from 50 to 109 feet thick under the superficial lava formation, and contains much sand and small gravel. Had that channel been occupied by a river, the velocity of the stream, with such a slope, would have swept out all that sand and gravel in half an hour."

"But it is of no practical consequence how the gravel got there. The miner deals with the facts as he finds them, and he knows that there is plenty of gold in the coarse material on the bedrock. The problem is to get at it, and to drain the channel. This may be done by a tunnel, or by a shaft, with pumping."

"The country about Oroville, and at other points along the great range, covers vast deposits of gravel rich in gold. I have never seen the Magalia mine that it is now proposed to reopen, but know of it by reputation as a large producer of gold under past workings, and see no reason why it should not again yield well. There is bound to be a great development of drift mining, and it is not unlikely that our drift mines will ulti-

mately yield as much annually as our quartz mines. This is because it is relatively easier to get at the gold in the gravel than in the lode. Both sources of this precious metal are practically inexhaustible.

"There never was a time when there was more inquiry for California gold mines, as permanent investments, than there is now. People who used to think gold mining a speculation are finding out that it is a legitimate and safe business, when conducted on sound principles and with due caution."

Mr. Chipman's citing of old mines reopened and reworked at great profit illustrates the statement made. Because a mine is idle or abandoned does not argue against its value. Probably all that it needed was capital or a little stick-to-it-iveness, or both. Many an idle or forsaken claim holds great wealth for its developer.

It would, of course, be better to have our mines developed by home capital and have the profit retained at home, but it would be better to have mines being worked by foreign capital than to have them idle or undeveloped. The majority of mines employ a good many men and buy large quantities of supplies. The next best thing to having money one's self is for some one else to have it.

A Valuable Gold Mine.

The Alaska Treadwell Gold Mining Company of Douglas Island, Alaska, has declared a bonus dividend of 75 cents per share, or \$150,000, payable next Monday, the 11th. The Treadwell mine originally cost the man after whom it is named \$150. About \$800,000 has been spent developing the mine; \$300,000 was spent experimenting with chlorination. About 600 tons of ore is milled daily, at an average cost of \$1.25 a ton. The ore averages in value three dollars a ton. The company is said to have refused \$16,000,000 for the mine. It is thought that there is nearly \$25,000,000 in sight.

Clipped and Condensed.

THE United States revenue cutter Bear is reported a total loss off the entrance to Sitka, Alaska, all hands saved.

Oregon elected last Monday an entire State and legislative ticket by an average Republican plurality of 10,000.

EASTERN manufacturers of fire arms are unable to keep up with orders from the Pennsylvania coal mining districts.

It is thought that the losses throughout the country during the last few weeks by violent floods will aggregate \$20,000,000.

The California commissioners to the Chicago exposition will have \$20,000 left to turn into the State treasury after paying all bills.

A BILL has been beaten by a decisive majority in the House of Representatives looking to the re-introduction of the old State-bank issue of currency.

COLLISIONS of strikers and other armed men are of daily occurrence in the bituminous coal regions. So far the strikers are successful and defiant.

It is stated in Washington on high authority that the statements regarding another bond issue in contemplation are absolutely without foundation.

The total coinage of the mints of the United States during May, 1894, was \$9,120,450, of which \$3,445,450 was gold and \$5,675,000 was silver. The silver coinage was entirely of half-dollars and quarters.

The New York legislature has passed a bill abolishing the customary three days' grace in the payment of checks, drafts, etc. The American Bankers' Association is trying to have similar action taken by all the State legislatures.

JAS. W. HAAS, formerly postmaster at Mineral Park, Arizona, has been arrested charged with opening registered letters; two letters passing through that postoffice to El Dorado Canyon had been opened and \$500 in currency abstracted.

THE report of the Suez Canal Company shows that in 1893 its revenue amounted to 75,579,992 francs, and the expenses, including five per cent interest, amounted to 36,964,455 francs. This leaves a profit of about 40,000,000 francs, giving a dividend of 72 francs, which, added to the five per cent interest, makes 79 francs per share.

FOURTY years ago the present Lord Roseberry, then a boy of 17, is reported to have declared that he would marry the richest heiress in England, become prime minister, and win the Derby. The first and second he accomplished. Last Wednesday his horse Ladas won the Derby, and Roseberry took it as a premonition, he being a prophet with honor in his own country.

THE American archaeologists who went to the recently discovered deserted city in the Sierra Madre mountains have found another hidden city five Spanish leagues north of the first. The leader, C. W. Penlon, interviewed at Mapimi, Mex., says these cities were evidently twin capitals of a wealthy district long before the Aztecs. The two are connected underground by passages hewn out of the solid rock.

ATTORNEY-GENERAL OLNEY has filed against the estate of the late Senator Stanford a claim in behalf of the United States for the sum of \$15,000,000, that being the proportionate share of the debt of the Central Pacific Railroad that estate owes the Government under the theory that the personal assets of the individual members of the original Central Pacific syndicate are liable for the debt of that corporation due or to become due to the United States.

THE floods in Colorado have occasioned widespread disaster, the greatest damage being around Pueblo. It is reported seven lives were lost. Boulder also suffered, the losses in that vicinity being estimated at \$500,000. Crisman and Selina, two mining camps in Boulder canyon, were swept out of existence. British Columbia has also suffered. The Fraser river is six inches above the highest historical mark and the Fraser valley for over 100 miles is devastated. It is estimated that over 2000 families are homeless and the property loss is \$3,000,000.

Concentrates.

So far, this has been the rainiest June in the history of the State.

THERE are 110 men on the pay roll of the Congress mine near Tombstone, Arizona.

THE smelter at Tucson, which cost \$15,000, was recently sold at sheriff's sale for \$1200.

THE Crescent and Murphy mining districts, in Lincoln Co., Nevada, have consolidated.

THE Great Western Quicksilver Mining Company of Napa is putting in new and improved machinery.

NEARLY 20,000,000 in gold left this country for Europe during May, and the nation is not on a gold basis yet.

THE Bald Eagle Mining Co. has incorporated in this city with \$100,000 capital, of which \$50 has been subscribed.

THE Davidson mine on Missouri Flat, near Grant's Pass, Oregon, is digging out a rich pocket which pays \$24 a day to the man.

SAYS the Denver Mining Review: The gold miner is now the only person who is sure of a market for his entire production at the highest known price.

THE Brunswick shaft, near Grass Valley, is to be sunk another hundred feet by contract, this work making the mine 800 feet in depth when completed.

THE Western Federation of Miners' Union, at the Salt Lake, Utah, meeting, endorsed the action of the striking miners at Cripple Creek and the Comr d'Alene.

EASTERN WASHINGTON and western Idaho miners have memorialized Congress to pass a law suspending assessment work for '94, similar to the law passed for '93.

THE Granite Pay-Streak ecstatically declares that "Leadville should change its motto from 'the greatest silver-mining camp on earth' to 'the greatest gold-mining camp on earth.'"

THE Boston & Montana Mining Company has declared a dividend of \$1 per share, payable on the 28th inst., the first since the reconstruction of the works was begun three years ago.

THE Grass Valley Telegraph would not advise any one to go there to seek employment, and says the mining superintendent is "struck" dozens of times per day by parties wanting work.

THE Honss Committee on Mining has authorized Chairman Weadock to favorably report one of the several bills to extend for one year the time of perfecting mining claims under the statute.

A MINING district which will be known as the "Mud Hills" district has been formed. It lies about 22 miles southwest of Vanderbilt and three miles west of Government Wells. Alex. Carlisle is the recorder.

THE Bankers' Mining and Milling Company, with its main office in Newark, New Jersey, is organized with \$250,000 capital, to carry on the business of mining and milling ores in Colorado, California and Nevada.

A COMPLAINT has been sworn to in the Justices' Court at San Jose charging C. A. Stockton, president and manager of the Standard Gold and Silver Mining Company with having forged the name of H. C. Morrill and Tyler Beach to a note for \$250.

THE Superior Court has ordered that the Idaho Mining Company be dissolved. Thus, says the Grass Valley Union, the company as a corporation which owned the famous old mine with a record of having produced nearly \$13,000,000 goes out of existence.

THE recent appeal for funds to continue the State mining exhibit at the fair during the month of June has been of a result sufficiently satisfactory to warrant the Executive Committee of the State Miners' Association in keeping the exhibit open till the close of the Exposition.

THE Sahjuauro Mining Company has incorporated with a capital of \$500,000, fully subscribed. Directors—Hamilton W. Gray, Henry Gray, E. H. Brandt, George Heazleton, John Finlay. The two first named directors subscribe \$249,850 each toward the capital stock.

THE Phoenix, Arizona, Gazette claims that during the last year Arizona has made greater progress in the output of gold than it had in the previous ten. Present estimates for 1894 are in the neighborhood of \$5,000,000, and if this is reached the Gazette predicts that the amount will be doubled next year.

ALL treasure from the Angele mines will be shipped via Valley Springs hereafter instead of by way of Milton. The Ledger says this change has been made as the Milton route is the popular one for travelers, and since highwaymen have become so numerous and daring a large number of people travel by private conveyance.

THE Nevada City Herald thinks that if our great mining men who are now flocking to South Africa to seek investments would look nearer home for the same, they would not only find large and paying gold properties enough to satisfy the most ambitious, but would have the advantage of living in a white man's land.

THE Leonard mine has been sold for \$6000 cash. According to the Calaveras Citizen, a force of men are already at work running a tunnel and widening the road to haul in machinery, and a ten-stamp mill will be erected on the ground immediately. This is the property managed by W. S. Weymouth of Drytown for the Crocker of Fitchburg, Massachusetts.

THE Virginia Enterprise says that during the past six months many new and valuable gold discoveries have been made in Nevada. The new finds have been made principally in the eastern, central and southeastern parts of the State. In these sections prospecting has of late been more active than in the older districts in the western part of the State.

THE Amador Dispatch says a number of creditors have commenced attachment suits against the Gover mine during the past week, and the miners are feeling somewhat dubious about their wages unless they file liens. It is understood, however, that all claims will be settled within a short time, and that work will proceed as heretofore, except on a larger scale. There

is an immense body of fair-grade ore in sight in that mine, but it will require a larger mill to make the property a heavy-paying enterprise.

THE Mercer M. & M. Co., operating the famous Mercer mine, Camp Floyd district, Utah, met in Salt Lake, reports the Record, and decided to overhaul and repair the present milling plant and increase the capacity to 200 tons of ore per day; and further, to put in new crushing machinery. The company will also build a tramway, to be operated by steam power, from the mill to their mines. A \$25,000 dividend was authorized to be paid next Friday.

THE gold coinage executed at the Philadelphia mint during the fiscal year was the largest in the history of the mint. The total was about \$30,000,000, against only \$11,840,202 for the calendar year 1892, and \$10,282,185 for 1891. The largest previous record was in 1861, when the gold coinage was \$67,588,150, and in 1881, when the amount was \$67,272,810. The large coinage of the present year has been due principally to the demand for gold from the Treasury. The export demand now has to be met in coin, for the act of 1890 authorizes the Secretary of the Treasury to impose a charge for gold bars.

TALKING of damage to mines in Colorado by the recent freshets, J. E. Marden, contracting freight agent of the Union Pacific, having walked all the distance from Central City to Golden, Col., said: "No one can conceive of the destruction in that part of the country. Every mine in Central City is flooded, and there is not a vestige of a placer mine left in Clear Creek. Between Central City and Forke Creek there are 28 washouts, averaging from 10 to 15 feet in width. Between Idaho Springs and Golden there are 36 washouts." The mining men in Central City estimate the loss to the county at \$500,000.

CIVILIZATION is rapidly advancing in the Yukon region, Alaska. Forty-Mile City is the largest camp and contains 98 buildings, including miners' cabins, two large stores, one music hall, five saloons, one billiard parlor, one tin shop, two blacksmith shops, two assay offices, a mission church and one shoemaker. Provisions of all descriptions and clothing are sold at very reasonable prices. Canadian rye, British Columbia rum and high-pressure brandy are selling at the reduced rates of four bits a glass, \$8 a bottle, or \$36 a gallon. This reduction is owing to the large quantities now in transit to Forty-Mile creek.

MA. JACKSON, the discoverer of the "Jackson process" which is making some present stir in Colorado, is about to establish a plant in Pueblo. Boiled down, his process is about as follows: The ore is pulverized to 50 or 65 mesh fine; then roasted until the volatile impurities are driven off and the ore becomes sweet. A mixture of ores is generally used so that one may act as a flux to another. After roasting, the ore is chloridized, cooled and placed in tanks, where the base metals are dissolved out with water, leaving the gold and silver chlorides, which are dissolved by a solution composed of hyposulphite of sodium and salt. The gold and silver are then precipitated by electricity. The precipitates are washed, dried, melted and run into bars ready for shipment. The claim is made that a saving of \$22 per ton can be effected.

THE following Washoe mining companies had cash on hand as follows June 1st: Alpha, \$10,432.60; Alta, \$2364.84; Andes, \$19,996.71; Belcher, \$22,206.64; Best & Belcher, \$6398.51; Bullion, \$8305.06; Caledonia, \$6709.31; Challenge, \$2135.32; Chollar, \$14,829.03; Con. Imperial, \$2613.93; Confidence, \$5013.50; Con. New York, \$1470.25; Con. Cal. & Va., \$63,503.13; Crown Point, \$19,483.46; Eschschuer, \$1902.92; East Sierra Nevada, \$638.32; Gould & Curry, \$7962.21; Hale & Norcross, \$10,573.37; Julia, \$717.25; Justice, \$1715.94; Kentuck, \$1141.37; Lady Washington, \$220.14; Mexican, \$5167.83; Ophir, \$1144.25; Overman, \$4257.85; Occidental, \$124.29; Potosi, \$13,836.93; Savage, \$10,295.62; Scorpion, \$2094.41; Seg. Belcher, \$1577.46; Sierra Nevada, \$12,656.93; Silver Hill, \$392.02; Union, \$5479.23; Utah, \$1816.53. The Bodie District mining companies report cash on hand on that date as follows: Bodie, \$14,060.83; Bulwer, \$19.78; Mono, \$4531.85; Standard, \$34,064.86; Syndicate, \$952.86. The following Tuscarora mines had an indebtedness on that date as follows: Belle Isle, \$1920.30; Commonwealth, \$25,000; Navajo, \$2078.93; North Belle Isle, \$2361.81; North Commonwealth, \$1695.64; Grand Prize, \$416.67. The Nevada Queen had \$1359.70 cash on hand.

Personal.

SECRETARY W. C. RALSTON has returned from a business trip to Nevada county.

LIAUT. GILLATTA of the Debris Commission has returned from a business trip to Sierra county.

A. C. KYLA will represent Sup't Prendergast on the Comstock during the latter's European visit.

JOHN LAWANOA, formerly of Nevada City, will be the new superintendent of the Imperial mine in the Kennedy district.

W. F. STAUNTON has been appointed superintendent of the Congress mine, near Tombstone. E. B. Gage is the general manager.

CHAS. DOOLAN, a well-known metallurgist and mill superintendent, has been appointed superintendent of the Brown Bear Mining Co., Trinity county.

L. L. MYERS, late superintendent of the Spring Valley Gold Co.'s works at Cherokee, has accepted the superintendency of the Bloomfield mine of North Bloomfield at a salary of \$500 per month.

H. W. FAIRBANKS and R. P. HESGAN of the State Mining Bureau left Lone Pine on May 26th to ascend Mt. Whitney, and the following day succeeded, it being the first time that the summit of the mountain was reached so early in the year. They report enduring some hardship in the snow. On the summit the cold was so intense they only remained a few minutes.

WM. WHITA, a miner, who, if alive, is 62 years old, worked at the New Rocky Bar mine in Grass Valley, and left there in 1884 for Victoria, British Columbia. He arrived at Victoria and was then going to Williams creek. Since that year nothing has been heard of him. When he left he had considerable money with him. Any one knowing of his whereabouts or knowing whether he is dead or alive will confer a favor by writing to Roger Shackleton, Grass Valley, California.

Mines and Mills of Northern California.

TO THE EDITOR:—It was Lamartine who said that "viewing the ocean sets thought free." A roam through the mines and mountains brings the same result, I see—hence this letter. A revival of thought from new scenes is refreshing, and sometimes when dotted off into printers' ink is information to others. It was dusk when we boarded the cars at Oakland pier, but all was bright, balmy and cheerful when we stepped from them next morning in Shasta county, 257 miles north of our starting point. There is no use of dwelling on the grandeur of a cloudless sky, green forests and flowering fruit trees. It is spring, and spring in California means beauty everywhere.

After satisfying the inner man at the Middle Creek hotel, we commenced our roamings by going to W. P. Miller & Co.'s quartz mill. This is a new 10-stamp steam mill, not yet completed. It is intended for a custom mill, and will work ore and slimes by a new plan of Mr. Miller's introducing. All relating to the new plan of manipulating, after crushing, not being in, we are unable to give a proper account of it, hence must pass it by. Mr. Miller is a skilled millman—one who has had a varied metallurgical experience. This mill is not over 50 feet from the California & Oregon railroad, and only about one-quarter of a mile from the Middle Creek station, and is well situated for a custom mill. We are now on the westerly bank of the Sacramento river, a crystal clear stream having an abundance of water, and which in the near future will become important for manufacturing and electrical purposes. About a quarter of a mile from Miller's mill, going north, are the mill and mines of the Eureka Tellurium Gold Mining Co., Peter Shearer superintendent. Here is a fine, new, 10-stamp steam mill, with silver plates and concentrators, all well arranged. There are several mines connected with this property, among them the celebrated tellurium mine, which some years ago became famous from its great output of telluride of gold. The several mines connected with this company are as yet having only surface development; even the "tellurium" has less than 150 feet of depth. The gold of these ores is not only exceedingly fine, but otherwise hard to save by general mill process. Mr. Shearer is an active, earnest worker, and has an abiding faith in the ultimate of this property. His plant is well equipped, but what is wanted is depth on the lodes. This scratching on the surface is lost time. About one-quarter of a mile above Middle Creek, which is simply a railroad station, post and telegraph office, and what is called a hotel, is Soroni's 10-stamp mill, having merely silver plates and blanket sluices, as gold-savers. This is a neat little mill, which runs only at intervals on good pay ore from a mine belonging to the mill company which is being opened by a long tunnel.

About three miles from Middle Creek is the town of Shasta, once so lively from the great abundance of gold which flowed into it, and mined from the surrounding gulches; also famous as once the home of Jim Keene, Alpheus Bull and other notables. Shasta is a very pleasant-looking mountain town, but as far as population goes, seems a deserted village; but, taking into consideration the many quartz ledges in its vicinity, with energy and capital, the future may be better than the present. Its population want to wake up to the fact that a shallow hole in the ground, on a quartz lode, doesn't make a mine worth thousands of dollars. We tarried here but a short time, and, under the leadership of an old-timer, made a short cut through the woods for the Sacramento river, which is some four miles to the east. In due time we were on the borders of the stream, here having a width of about 300 feet. Our trail led down to the mill of the Shasta Gold Extraction Co., where is also a "flag station," known as "Calumet Spur." The Shasta mill is for working by the cyanide process, and reduces the ore dry; has dry-working pulverizers, and numerous iron and wooden tanks for leaching, etc. It is a neatly constructed mill, and is fixed for operating by steam and water power. The mill has been idle for some time, more from the fact that ores could not be purchased in quantities to justify running, than anything else. It was put up solely as a custom mill.

Nearly opposite the Shasta mill, on the easterly bank of the Sacramento river, is the Calumet mill, built some years ago by Almarin B. Paul, as general manager of the Calumet Gold Mining Co. This locality we reached by crossing on a neat wire suspension bridge, which carries large water pipes and which conveys water for power. This pipe is the ending of a large water system of ditches, flumes and pipes, extending some seven miles back into the mountains. The outlay for this power alone was over \$75,000. The Calumet is the finest of all California mill sites—there is order and beauty all through. The mill and numerous buildings are all on a direct line, on an avenue lined with shade trees, all fruit bearing; these, with gardens of flowers in profusion, vegetables, vineyards, and trees of all kinds of fruits, nuts, etc., make it not only beautiful, but a

homelike, comfortable place. The mill proper has now 24 stamps, with a large arrastra mill attached, cyanide tanks, etc., and all water-power facilities for 100-horse power and over.

These works, together with a three-mile tram road, have recently been leased to the Original Quartz Hill Gold Mining Company, a Chicago incorporation, which has as its general manager Mr. M. Maryanski, a mining engineer of graduated and practical experience, not only in Europe and Mexico, but California. Mr. M. is a decidedly modern miner, being a man of scope in his ideas and endeavors, and a clear-headed calculator—more of an American in his mining spirit than foreigners generally are, in this country at least. To this mill ten more stamps are now being added, bringing the capacity up to 50 tons or more per day. The plant will be fully equipped with silver plates, concentrators and canvas platforms, etc. Connected with this work is a three-mile steel T-rail road, which goes direct to the mine of the company—Quartz Hill. The Original Quartz Hill mine is one of the wonders of quartz deposits. The croppings for 650 feet about show an average width of 43 feet. There are some 200,000 tons in sight and ready to go to work on, and all mineralized. Of course the eye is not as correct in estimating the value of ore as an assay, but when all the advantages here are considered—first, that you can mine for about 50 cents a ton (the company will use machine drills running by steam); second, the facilities for transporting ore for a trifle, and working out the gold by water power on a capacity of 50 tons or more a day—why it looks as though California brickbats would pay, let alone so large a body of quartz that here and there shows specks of gold to the eye. The mine and railroad are under the supervision of Mr. De Yerski, a thoroughly educated mining engineer, and one who shows by his work that he is master of all he undertakes.

Being now in what is called "Old Diggins" mining district, our desire was to take in all possible and make Redding before dark. Our next move was to the mine of the Calumet Company. This mine has a large and lengthy outcrop, and has, above the adit level, furnished a large amount of ore. The mine is closed down for the present, as hoisting works have to be erected before working deeper. The next in line is the Union Consolidated or Walkers mine—Walkers of Salt Lake. Here development work is being carried on by tunneling, which at best gives but a meager depth on the lode. This lode taking in the Calumet is traceable by the croppings for over a mile and varies in width from 2 feet to 12 and 14 feet. The Walkers have a modern ten-stamp mill on the river, which at this time was not running. Mr. Rippetto, formerly of Salt Lake, manages this property. Next going north on the line is the "Old Spanish," owned by Hendy and others of San Francisco. Nothing is being done here, although there is a large outcrop of quartz to luvite enterprise and cash. Following still on is the "Central," belonging to Bless & Co. of New York. Here a good deal of work has been done, and at one time the market produced largely of rich ore, but latterly they have lost the pay chute, which always takes pluck and coin to recover. There is a good steam mill, with Huntington pans, concentrators, etc., connected with this property. Next claim is the Mammoth, belonging to a Philadelphia company. Here they are running a long tunnel, which will tap the lode pretty well down. The Mammoth is a very large deposit of quartz, averaging over seven feet in width. Mr. S. W. Cheney is in charge here. Next and last on the line is Hart's, but not the least by considerable. This mine is also known as the Texas and Georgia, and is owned by R. G. Hart, Sr. It is the best developed property on the line, having some five tunnels, which give a developed depth of about 900 feet below the apex. A very large amount of very rich ore has been extracted from this mine. Recently a fifth tunnel, 1700 feet in length, has reached the lode, developing another rich deposit of mineral. The width of this lode varies from 2 feet to 14. Mr. Hart, Sr., gives his personal attention to the management of his mine and mill, and that means a good deal, as Mr. Hart is a thorough miner, having been in the business from a boy. Connected with this property is a 20-stamp steam mill. The ore is transferred from mine to mill by a wire tramway, which works to completeness. This tram is about a mile long. The mill is equipped with silver plates, eight Improved Triumph concentrators, and canvas platform concentrator. The work of extracting the metal is about as complete as can be found in any mill working gold ores, and yet Mr. Hart does not claim he gets it all. This mill, like all the others in the district, is down by the Sacramento river, which furnishes a never-failing supply of good clear water. Taking a review of all the camps this day visited, I am impressed to say there is no locality in the whole State where is centered owners having so much wealth at their backs as in this Old Diggins district, and yet the one the least able

has done the most development and received the largest reward for it. Development makes the mine, and often the millions. Thus ends a very interesting and instructive day. We have not in this letter gone into details, and yet give a varied outline of a live and prosperous mining section of northern California. CARROL G. SPRAGUE.
May 30th, 1894.

Loss of Gold in Milling Ore.

TO THE EDITOR:—In your issue of June 2d, in an article under the heading of "Loss of Gold in Milling Ore," by T. A. Rickard of Denver, Colorado, the following occurs: "At any large, well-managed mill supplied with the output of any particular mine, it is found that about as much gold is obtained in the mill as the fire assay shows." Also, "Now, the mill gold is about 760 to 780 fine, therefore the saving by amalgamation is close to 76 to 78 per cent." These are very extraordinary statements, as they stand, without explanation.

The determining of per cent of gold saved by fineness of the bullion produced is a new idea to me, and I would like to get the figures, philosophy or chemistry by which in so simple a manner the percentage can be determined, as it has generally cost me a good deal of labor and time to accomplish this important point. By asking the question, How? I may be showing a lack of knowledge had by some younger students in milling, but let it be as it may, I don't consider myself too old to learn, though I may think such observations absurd. ALMARIN B. PAUL.

Room 5, Crocker Building, S. F., June 5, 1894.

Additional Information Requested.

TO THE EDITOR:—The writer is pleased to perceive, as pointed out by Mr. Rickard, that the Colorado milling practice is not in as bad a way as generally reported.

Mr. Rickard informs us that "as much gold is obtained in (Gilpin county) mills as the fire assay shows"—a very extraordinary good showing. He continues: "Now, the mill gold is about 760 to 780 fine; therefore, the saving by amalgamation is close to 76 to 78 per cent."

I fail to see the connection between the fineness of 760-780 of the mill gold with an extraction of 76-80 per cent by amalgamation. Will Mr. Rickard please throw additional light on the subject? G. F. DEETKEN.

Auburn, June 4, 1894

It Paid 281 Dividends.

Friday afternoon, says the Grass Valley Telegraph, the Idaho Gold Mining Company declared dividend No. 281, and the amount was \$6.53 per share, upon the capital stock aggregating \$20,257.58.

The glorious old company was dissolved Friday, the Court declaring it fully so. All debts have been paid and everything settled fully and completely and to the satisfaction of everybody.

During the working of the mine under the direction of the Coleman Bros., \$11,637,894 has been extracted from the lode, and out of that amount \$5,146,107.58 have been paid to the shareholders in dividends.

The mine has been so thoroughly written up during these years that it would be superfluous to repeat the old, old story. It has become famous throughout the world. The mine still goes on, only under another name—the Maryland—and Samuel P. Dorsey is the superintendent and principal owner. There were eighteen stockholders in the Idaho Company, as follows:

	No. Shares.
John C. and Edward Coleman	1,850
M. P. O'Connor	550
Geo. D. McLean	222
John Polglais	100
Chas. Webb Howard	70
John Carter	50
S. P. Dorsey (Trustee)	40
John Bree	30
Eugene C. Creller	30
Jos. Polglais	20
Frank G. Beatty	20
Wm. Coleman	20
Stella Dunston	12½
W. H. Miners	12½
Sarah A. Coleman	10
Jas. Tremewen	15
F. D. Sheener	10
Geo. W. Hill	10

A Special Prize.

W. F. Derham of this city, who won the first prize in the single-hand drilling contest at the Midwinter Fair, to-day received from San Francisco a special prize which consists of a handsome black walnut box containing a silver-plated hammer and drill, both regulation size. On the lid of the box is a silver-plated shield bearing the inscription that it was given to Mr. Derham as a special prize by the Dunham, Carrigan & Hayden Company. The recipient is very proud of the prize.—Nevada City Transcript, May 31.

The Mineral Hydrocarbons.

Their History, Geography, Geology, Physical and Chemical Properties and Uses.

NUMBER II.

Written for the MINING AND SCIENTIFIC PRESS and copyrighted 1894 by Henry G. Hanks, F. G. S.

Strabo (Book 16, chap. II, sec. 42): "The Lake Sirbonis (the Dead sea) is of great extent. * * * It abounds with asphaltum which rises, not, however, at any regular season, in bubbles like boiling water, from the middle of the deepest part; the surface is convex and presents the appearance of a billock. Together with the asphaltus there ascends a great quantity of sooty vapor, not perceptible to the eye, which tarnishes copper, silver and everything bright, even gold. The neighboring people know by the tarnishing of their vessels that the asphaltus is beginning to rise and they prepare to collect it by means of rafts composed of reeds. * * * The asphaltus is a clod of earth liquefied by heat; the air forces it to the surface, where it spreads itself. It is again changed into a firm and solid mass by cold water, such as the water of the lake; that it requires cutting or chopping for use. It floats on the water, which, as I have described, does not admit of diving or immersion, but lifts the person who goes into it. Those who go on rafts for the asphaltus, cut it in pieces and take away as much as they are able to carry. * * * It is natural for these phenomena to take place in the middle of the lake, because the source of the fire is in the center and the greater part of the asphaltus comes from thence. The bubbling, however, of the asphaltus is irregular because the motion of the fire, like that of any other vapor, has no order perceptible to observers. There are also phenomena of this kind in Apollonia in Epirus. * * * The Egyptians use the asphaltus for embalming the bodies of their dead."

Diodorus Siculus (Book 19, chap. VI) thus refers to the same subject; possibly this is his version of Strabo's account. These authors were nearly contemporaneous: "He (Demetrius) encamped near to the Lake Asphaltus, the nature of which it is not fit to pass over without giving some account of it. * * * Every year rises out of the middle of it great massy pieces of bitumen and pitch, sometimes bigger than three plethras and sometimes a little less than one, and upon that account the barbarous inhabitants call the larger pieces 'bulls' and the less 'calves.' These pieces of pitch and brimstone floating upon the water seem at a distance to be as so many islands. There are evident signs that forego and give notice of the casting up of this bituminous matter at least 20 days before, for a horrid smell of brimstone and pitch infects the air all round the lake at many furlongs distant, and all metals, whether gold, silver or copper, near the place change their natural color, which presently returns as soon as the brimstone is exhaled. The places bordering on it are so burning hot (by reason of the sulphur and brimstone under ground) and cast forth such an horrible stench that the inhabitants are very unhealthy and short lived. * * * The inhabitants on both sides of the lake are so earnest to carry away this brimstone that they fight one with another, and they bring it off in a strange manner without shipping, for they cast in huge buoies of bulrushes fastened together, upon which three or more of them place themselves, two of which ply the oars that are fastened to the bulrushes, and the third carries a bow and arrows to defend themselves against such as attempt to make up upon them from the other side, or that may offer them any violence. As soon as they come to the brimstone they get upon it and hew it to pieces with axes as pieces of stone out of a soft rock, and so loading the bulrush boat they row back. * * * And this profit and advantage the barbarians reap from it—they transport this pitch into Egypt and there sell it for the use of embalming the dead, for if they do not mix this with aromatic spices, the bodies cannot be preserved from putrefaction."

Thomas Shaw (Travels or Observations Relating to Several Parts of Barbary and the Levant, Oxford 1738, fol. 374) thus describes, second hand, the bitumen which rises on the surface of the Dead sea:

"I was informed that the bitumen for which this lake has been always remarkable, is raised at certain times from the bottom in large hemispheres, which as soon as they touch the surface, and so are acted on by the external air, burst at once with a great smoke and noise like the *Pulvis fulminans* of the chemists and disperse themselves round about in a thousand places. But this happens only near the shore, for in greater depths the eruptions are supposed to discover themselves in such columns of smoke as are now and then observed to arise from the lake, and perhaps to such eruptions as these we may attribute that variety of pits and hollows which are found in the neighborhood of the lake and compared very justly by Mr. Maundrell to

those places in England where there have been formerly lime kilns. The bitumen, in all probability, is accompanied from the bottom with sulphur, inasmuch as both of them are found promiscuously on the wash of the shore. The latter is exactly the same with common native sulphur, the former is friable, heavier than water, yielding upon friction, or by being set on fire, a foetid smell. Neither doth it appear to be as Dioscorides describeth his asphaltus of a purplish color, but is as black as jet and exactly of the same shining appearance."

"That dede See departethe the Lond of Ynde and of Arabye: and that See lastethe from Soara unto Arabye. The Watre of that See is fulle bytter and Salt: and zif the Erthe were made moyst and weet with that Watre, it wolde nevere bere Fruyt. And the Erthe and the Lond changeth often his colour. And it casterh out of the Watre a thing that men clepen Asfalt: also gret peces, as the gretnesse of an Hors, every day, and on alle sydes." (The Voiage and Travaile of Sir John Maundevile, Kt. (about 1370), chap. IX).

Professor Edward Hitchcock contributed a paper to the Association of American Geologists and Naturalists (Reports of the 1st, 2d and 3d meetings, Boston, 1843) entitled "Notes on the Geology of Several Parts of Western Asia," in which he quotes (folio 371) from the work of Robinson & Smith (Biblical Researches in Palestine, a journal of travels in 1838, Boston) who visited the locality, that there were then no bituminous springs or outflows of bitumen known, although there was a tradition among the Arabs to the effect that bitumen exudes from the rocks on the Eastern shore. After earthquakes, which are not uncommon, large masses of asphaltum are found floating on the surface of the Dead sea. After a violent disturbance in 1834, large quantities drifted to the south shore, of which the Arabs brought 6000 pounds to market. In 1837, after another earthquake, a mass like an island rose to the surface, of which the inhabitants sold \$3000 worth. This modern account quite agrees with the ancient statement of Diodorus Siculus quoted above.

Lieut. Lynch, U. S. army, was sent by the United States Government in 1847 to make explorations of the Dead sea. He frequently mentions asphaltum, once in the following words: "Most of the asphaltum met with in commerce is obtained from this lake and is hence called 'Jewish bitumen.'" In another place he ascribes the name "Lacus Asphaltites" to the quantity of asphaltum in a soft or liquid state (maltha) that floats on its surface and the bituminous inflammable stones found on its shores. "Modern travelers think the supply is either exhausted or that the accounts of the ancients were exaggerated. Large deposits have been overlooked by recent visitors or they do not exist." Lieut. Lynch found bitumen along the shores in occasional lumps and incrustations. The mineral was bright and smooth; when broken it looked like consolidated fluid. The Arabs called it 'Moses' stone.' (Fol. 304)

Tristram, quoted in the Encyclopedia Britannica, describes a valley in which were seen masses of bitumen, mingled with gravel and sulphur, unlike that picked up on the shores, which he thought might have been poured down in a shower. Lynch mentions at many localities on the shores of the lake a distinct odor of sulphuretted hydrogen, which accounts for the sulphur in a natural way.

Herodotus (Eratosthenes 119) thus describes a territory, "the name of which is Arderica: It is 210 stades distant from Susa and 40 from the well that produces three different substances, for asphalt, salt and oil are drawn from it in the following manner: It is pumped up by means of a swipe, and, instead of a bucket, half of a wine skin is attached to it. Having dipped down with this, a man draws it up and then pours out the contents into a receiver, and, being poured from this into another, it assumes three different forms. The asphalt and the salt immediately become solid, but the oil they collect, and the Persians call it 'rhadinace.' It is black and emits a strong odor."

Strabo (Book 17, chap. III, sec. 11) thus refers to asphaltum in Mauretania, now Algeria: "Somewhere there are also copper mines and a spring of asphaltos."

It is doubtful if the ancients were generally aware of the combustible nature of coal. Wood being plenty they did not require it, even if they had some idea of its properties. They were familiar with amber and the diamond but had no conception of their chemical composition.

Theophrastus, who died about 286 B. C., wrote in his "History of Stones" as follows: "XXVI—Certain stones there are about Tetras in Sicily, which is over against Lipara, which empty themselves in the same manner in the fire. XXVII—And on the promontory called Erineas there is a great quantity of stone like that found about Bena, which when burnt emits a bituminous smell and leaves a matter resembling calcined earth. XXVIII—Those fossil substances which are called coals, and are broken for use, are earthy. They kindle, however, and

burn like wood coals. They are found in Liguria, where there also is amber, and in Elis, in the way to Olympias over the mountains. These are used by the smiths. XXIX—There is also found in the mine of Scaptisylæ a stone in its external appearance somewhat resembling rotten wood, on which if oil is poured it burns; but when the oil burns away the burning of the stone ceases, as if it were in itself not liable to such accidents. * * * XXIII—Some of the more brittle stones there also are, which become as it were burning coals when put into a fire, and continue so for a long time. Of this kind are those about Bena, found in mines and washed down by torrents, for they will take fire on throwing burning coals on them, and continue burning so long as any one blows them. Afterwards they will deaden and may after that be made to burn again. They are therefore of long continuance, but their smell is troublesome and disagreeable."

Jet was called by the ancients black amber—*succinum nigrum*. When Roman traders told of the burning of amber for fuel by the natives of the shores of the Black sea, it is now supposed that the material was a variety of lignite, and not amber as reported.

Mineral coal was probably used in China long before it was known to the Western world. The travels of Marco Polo were written and circulated in manuscript form in 1298. The following is a translation of that part which relates to the use of coal: (Book 2, chap. XXIII).

"Throughout this province—Cathay—there is found a sort of black stone which they dig out of the mountains, where it runs in veins. When lighted it burns like charcoal and retains the heat much better than wood, inasmuch that it may be preserved through the night and in the morning still be found burning. These stones do not flame, except a little when first lighted, but during their ignition give out a considerable heat. It is true there is no scarcity of wood in the country, but the multitude of inhabitants is so immense and their stoves and baths which they are continually heating so numerous, that the quantity could not supply the demand, for there is no person who does not frequent the warm bath at least three times in the week and daily during the winter, if it is within his power. Every man of rank or wealth has one in his house for his own use, and the stock of wood must soon prove inadequate to such consumption, whereas these stones may be had in the greatest abundance and at a cheap rate."

Du Halde confirms this statement as follows: "The mines of coal are very numerous—perhaps no kingdom in the world contains more. They make use of this fuel on all occasions, which is of infinite advantage in so cold a country, and where wood for firing is very scarce." (General history of China, vol. I, fol. 22.)

The ancient Britons made use of coal to a certain extent. Stone bammers have been found in coal croppings, and the name (formerly "cole") is of British origin. After the conquest the Romans began to use it, for coal clinders have been found in Roman walls, and Roman coins in beds of cinders. Ireland was probably colonized by a civilized people at a remote period, as evinced by the prehistoric round towers and other remains.

Rev. William Hamilton (Letters Concerning the Northern Coast of Antrim, etc.; Dublin, 1786) makes the following statement: "In my last letter I mentioned some reasons which might induce one to think that these collieries (Ballycastle Bay) were wrought at a very remote period of time. But an accidental discovery has lately put that matter beyond doubt and has laid open a very curious circumstance in the history of the country." The author then proceeds to relate that "Some workmen driving an adit level in new ground, broke through the rocky sides into a cavern. As the opening was not large, two young lads were induced to enter with candles, who found an extensive labyrinth of galleries and passages in which they became lost. The coal miners, becoming alarmed, enlarged the opening and went in to find the boys, which they did after a whole night's imprisonment. Pillars were found supporting the roof; in short, it was found to be an extensive mine wrought by a set of people at least as expert in the business as the present generation. Some remains of the tools and even baskets used in the works were discovered, but in such a state that on being touched they immediately fell to a powder. There was not the most remote tradition concerning these ancient works, the age of which might be inferred from the fact that stalactites in pillars reached from the roof to the floor. The supports of the roof were covered with sparry incrustations, which the present workmen do not observe to be deposited in any definite period of time."

(To be continued)

ALUMINUM is now to be used for engraving in place of stone and steel. It is claimed that, besides the advantage of lightness, an aluminum plate will furnish 8000 impressions, against 80 to 100 from a steel one.

Kinks in the Cable.

Like all mundane things, the street-railway cable is liable to go wrong, get out of fix, bend, break or "frazzle out." All day long and far into the night this long, black, flexible rope goes gliding noiselessly and swiftly through its conduit like a great blacksnake, while the busy hum of traffic, the rattle of wagons, the hurrying feet of pedestrians, the rumbling cars themselves, keep up their din above it. Strong steel clamps attached to heavy cars, laden with tons of humanity at times, clutch it in their steely grasp, but without a moment's pause or slack it glides along as swiftly and as easily to all seeming as before, dragging the car and its load of humanity flying after it.

But sometimes, says the *Baltimore American*, this slender, though powerful reptile, or, speaking more prosaically the cable, meets with mishaps, and, one part disabled, the whole becomes helpless. There are three accidents that the car companies have to fear with regard to the cable, or what they universally call the "rope." They are breaking ropes, breaking a strand of the wire and a "kink," or a short bend in the rope. Of course, a clear break renders the rope instantly useless. If only a strand is broken it can generally be temporarily repaired in a few minutes, leaving the permanent repairs to be done after the rope stops for the night. A "kink" is a particularly aggravating mishap, and if bad requires a long stop; if only slight, remains a nuisance. The universal remedy in any of the cases is "splicing," unless it be for a very slight "kink."

To understand how the injuries to a rope are made and how repaired, it is necessary to understand what it is composed of.

The inside of a street-railway cable—the core, or, in railway parlance, the "heart"—is a closely woven, strong hempen rope. About this core is woven steel wires into strands which entirely cover and envelop the hempen rope. No method has yet been invented of connecting two ends of a cable except by the old method of splicing, and nobody has yet made any sort of machine to facilitate the work, which must all be done by hand. Probably the difficulty that would first suggest itself to the uninitiated would be this: If the wires are woven into each other, the diameter at that point will necessarily be a good deal larger than other parts of the cable, and that bulging would catch in the grips of the cars and play havoc. To obviate that difficulty the hemp core is removed from the spliced part altogether, which matters little, because it is put in, not for the strength it gives, but to make the cable sufficiently flexible. Therefore, when a splice is made the wires are unwoven for three feet back from either end and the hemp heart removed. Then those loose wires, three feet of them at either end, are twisted and woven into each other until the spliced part is three feet of solid wire of exactly the same diameter as the remainder of the cable.

Eight, ten, sometimes twelve men work together splicing a cable. They are always experienced men, with nimble fingers, and quick because loss of time means loss of money, and time is literally money; but fast as the splicers are and nimble as their fingers are, they will do well if the splice is completed in an hour.

The first splice, when the cable is put in, is done, of course, in the power-house, where everything is as convenient as it can be made. But sometimes the rope does not break in the power-house, but on the road. Sometimes it breaks short off, or a strand breaks and rips the cable for a block, possibly.

All sorts of mishaps may occur to it, so that it must be stopped and mended right in the street. This is a mean job. First, should the cable break in two, the immense tension which is always on it jerks the broken ends a whole block or more away from each other. Plenty of slack rope must be furnished at the power-house, a number of horses must be harnessed to either of the broken ends, and they must be pulled together, and then plenty of "slack" to work with pulled out of a manhole. The splicers hurry to the spot with their tools and work at a disadvantage. If only a strand or two is broken the task is easier. In that case, the ruptured place nearly always gets into the power-house before it is so bad as to stop the cars.

In order that a broken strand should never pass in and out of the power-house before being repaired, an electric detector has been invented, so that the fact of a broken strand or even wire is communicated to the engineer as soon as it enters the power-house and before it can get out again. The detector is a very simple contrivance, being merely a piece of iron with two prongs, between which the cable has just room to pass. The cause of these various mishaps is almost invariably the mismanagement of the grip by the gripman. Of course not every splice is due to this, because every new rope that is put in must be spliced.

In this connection, it is interesting to know how a new cable is put in in place of an old one, for they must be

changed now and then. The old cable is cut and the new spliced roughly in the end that is leaving the power-house. Then the other end is started on a large coil, and as the new cable is unwound from one coil the old cable is wound on another until the new one comes around. This is decidedly easier than pulling the cable around with horses. When a new cable is started, the first thing is to get as much tar in it as possible. It is snaked in tar; tar is poured over it by the hour as it runs, etc., until it gets saturated with tar from surface to the center of the heart and the outside wires cannot be seen, the whole looking like a solid stick of licorice.

Arcturus, the Greatest of all Suns.

Since Sirius has practically disappeared with the progress of the year, the brightest fixed star in sight is Arcturus. It is worth while for anybody to take the very slight trouble needed to find Arcturus, for who would not wish to see what is, perhaps, the greatest sun contained in the visible universe? I suppose, says G. P. Serviss, in the *N. Y. Sun*, everybody knows the figure of the "Dipper" in the sky. At this season, about 9 P. M., it is nearly overhead in the north, its handle being to the east and its upturned bowl to the west of the meridian. Follow the curve of the handle to the end and extend it with a similar curvature for a distance somewhat exceeding the entire length of the Dipper, and you will find Arcturus. There is not the slightest danger of missing or mistaking it, for there is no star in that part of the sky possessing one-quarter of the brightness of Arcturus. A soft reddish tinge distinguishes its light from that of all its fainter neighbors. This reddish hue, which I believe to be variable, has a peculiar significance, as we shall see.

The statement will be found in some of the old school-books that Arcturus is probably one of the nearest of the stars. As a matter of fact, it is one of the most remote of those whose distance is measurable. It must be admitted that the few measures that have been made are very discordant, and in what follows I shall assume the correctness of the results obtained by Dr. Elkin. The measurement of the distance of a star is a very beautiful problem, and the fundamental principle is perfectly simple. It depends on the revolution of the earth around the sun. On the 1st of January the earth is about 186,000,000 miles from the place it will occupy on the 1st of July, because on those two dates it is at opposite points in its orbit, and the distance across the orbit is 186,000,000 miles. The diameter of the earth's orbit thus serves the purpose of a surveyor's base line. It is plain that the direction in which a star is seen cannot be exactly the same from both ends of that line unless the star's distance is so immense that the diameter of the earth's orbit bears no measurable ratio to it. Most of the stars are so distant that that ratio cannot be ascertained, but there are a few whose apparent places are appreciably different when viewed from the extremities of our 186,000,000-mile base line. According to Dr. Elkin, the position of Arcturus is thus shifted to the amount of 0.018 of a second of arc, and this is called its parallax. How exceedingly delicate the methods employed in measuring such a quantity must be can, perhaps, be understood when it is stated that 0.018 of a second of arc is equal to the apparent distance between the heads of two pins placed one inch apart and viewed from a distance of 180 miles!

Having ascertained the parallax of a star, the next step is an easy one. Multiply the earth's distance from the sun, 93,000,000 miles, by the number 206,265, which is a mathematical constant that I shall not here undertake to explain, and divide the result by the parallax of the star. The quotient will be the star's distance in miles. If we apply this rule in the case of Arcturus, we have

$$\frac{19,182,645,000,000}{0.018} = 1,065,790,250,000,000 \text{ miles.}$$

In round numbers, one thousand millions of millions of miles, or about 11,400,000 times the distance of the sun from the earth. The reader may jot down in his notebook the number 19,000,000,000,000, leaving off the less significant figures we have used above, and it will always enable him to ascertain the approximate distance in miles of a star whose parallax is given, this number being used as a dividend, and the parallax, expressed in the form of a decimal fraction, as a divisor.

Now, having found what Arcturus' distance is, another simple calculation will enable us to compare the actual amount of its light with that of the sun; in other words, to say how much greater a sun than ours it is.

Various estimates have been made from time to time of the light which we receive from certain of the brightest stars compared with that received from the sun. It is probably fairly accurate to say that the sun sends us about 25,000,000,000 times as much light as Arcturus does; in other words, that it would take twenty-five thousand million stars as bright as Arcturus to make daylight on the earth.

But, as everybody knows, the intensity of light decreases

with increase of distance. If we were twice as far away from the sun as we are, we should get only one-quarter as much light from it as we do; if we were three times as far away, we should get only one-ninth as much light, the light varying inversely as the square of the distance. Situated where we are, the sun gives us enormously more light than Arcturus does; but we have just seen how enormously farther than the sun Arcturus is. Let us suppose, then, that the earth could be removed to a point half-way between the sun and Arcturus. In that case those two shining bodies would be on equal terms so far as distance was concerned. Which, then, would give the greater light to the earth? Arcturus, unquestionably. The real distance of Arcturus is 11,400,000 times the real distance of the sun; but at a point half-way between them the sun's distance would be 5,700,000 times greater than it now is, while Arcturus' distance would be diminished one-half. But since light varies inversely as the square of the distance increases, the sun's light would be diminished the square of 5,700,000, or 32,490,000,000,000, while that of Arcturus would be quadrupled. Now, glancing back, we see that in the present position of the earth the sun's light exceeds Arcturus' light in the ratio of 25,000,000,000 to 1; but with the earth half-way between them, the sun's light has diminished, as a result of increased distance, 32,490,000,000,000 times, and Arcturus' light has increased, through decrease of distance, four times. Multiplying together these two numbers, and dividing the product by 25,000,000,000, we get 5198, which is the number of times that the light of Arcturus exceeds the sun's at an equal distance; so that Arcturus is really, as far as radiating power goes, equal to 5198 such suns as ours!

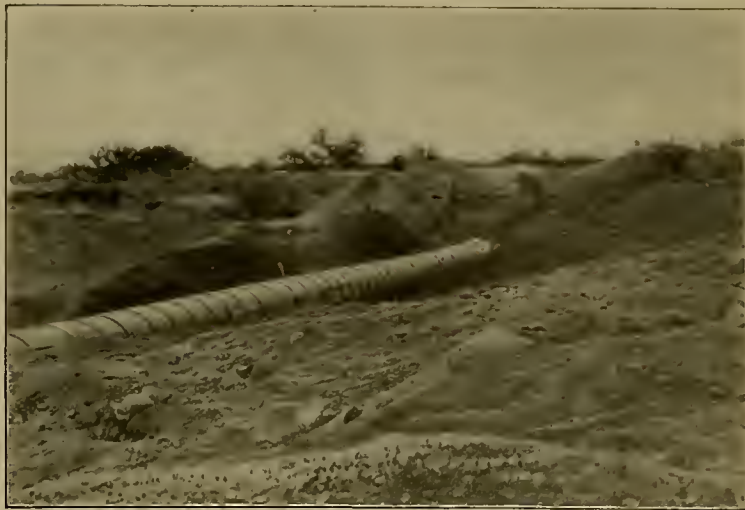
Does the heat of Arcturus exceed that of the sun in the same ratio? Very likely it does. If, then, we were as near to that giant star as we are to the sun, we should be not only blinded, but burned up. The frame of the earth itself would melt and dissolve and burst into a cloud of fiery vapors. If we suppose that the intensity of the radiation of Arcturus is the same as that of the sun per unit of surface, Arcturus must be about 72 times as great in diameter as the sun, and about 375,000 times as large in volume. Its diameter in miles is, on that supposition, no less than 62,350,000! Imagine all the planets of our solar system removed to Arcturus and set revolving around that star in orbits of the same size as those in which they travel around the sun. Poor little Mercury, when in perihelion, would be plunged more than 2,500,000 miles beneath the blazing surface of that marvelous sun; neither Venus nor the earth nor Mars, nor Jupiter would be able to withstand its overwhelming heat. Even Saturn, at a mean distance of 855,000,000 miles from the surface, would also be overwhelmed with that mighty outpouring of radiant energy; Uranus, 1,750,000,000 miles away, would be a most torrid and unendurable place of abode, if, indeed, it would be habitable at all, and Neptune, a thousand million miles more distant still, would broil under a fervid temperature nearly six times as intense as the mean temperature that the sun now imparts to the earth. If Arcturus is surrounded by inhabited worlds, it is plain that they must keep a very respectful distance between themselves and their solar ruler, or else they are inhabited by beings whose blood would freeze in their veins during a midsummer day in the Desert of Sahara.

We have some knowledge also of the kind of sun that Arcturus is. It belongs to a separate family from that of our orb of day. Leaving out of account their difference of magnitude, they are as unlike as an elm and an apple tree. I have spoken of the red tinge visible in the rays of Arcturus; the analysis of its light indicates that it is surrounded by a vast mantle of metallic vapors, enormously deeper and more extensive than the similar surroundings of the sun, shutting out an immense quantity of light, while at the same time the surface of the huge globe within glows with a greater intensity of heat than prevails on the sun. There is some reason for thinking that the screen may eventually be stripped from the face of this wonderful star, and that, as Sirius has done, it may change from red to white. Such a change might imply a tremendous increase of radiation. In 1852 its light suddenly faded, and the dazzling whiteness of its rays astonished those who had observed the change. In a few years it became red again. Its color is paler now than it has been in past years. This spring it has sometimes appeared to me to have almost parted with its familiar ruddy yellow tinge. What do such mutations import?

It would surely be worth the risk involved if we could place ourselves within easy observing distance of Arcturus, and study the play of solar energies there on a scale which dwarfs even the gigantic phenomena of the sun. And possibly the improvements that the coming century will undoubtedly bring to the telescope, the spectroscopic and other instruments of research will enable us to approach Arcturus in effect, if we cannot in fact; for man already sits like a god upon his little earth, and reaches out to the orbs that surround him.



SIPHON—RIVER SANTA CATALINAS IN DISTANCE, SANTA CRUZ VALLEY.



SIPHON AFTER CROSSING RIVER, SANTA CRUZ VALLEY.

An Arizona Enterprise.

Some one has figured out that the area of land cultivated by irrigation is greatly in excess of that cultivated by means of natural rainfall. In India 25,000,000 acres are made fruitful by irrigation. In Egypt there are about 6,000,000

acres, and in Europe about 5,000,000. The United States has about 4,000,000 acres of irrigated lands, and vastly more that is irrigable. This irrigated area is constantly increasing in our country, nowhere more rapidly than in Arizona.

The subject of irrigation is, indirectly at least, of sufficient consequence to mining enterprises to merit notice. Wherever mining is going on, abundant water and supplies are requisite, and, in this regard, anything that tends to produce abundance is of importance.

The accompanying illustrations, reproduced through the courtesy of the *American Mail and Export Journal*, are of

the workings of the Rillito Canal Company, the first of its kind in Arizona. The company originally began with a ditch on the Fort Lowell reservation, commencing about three miles east of its western boundary, finally developing it into a system for carrying water across the Rillito river to a fertile mesa of several thousand acres south of the

river and near Tucson. To do this they had to take the water of the canal from one bank of the Rillito river to the other. They did it by using an inverted siphon of California redwood, beveled, banded, and buried under the river bed, at right angles with the channel. It is 450 feet long; four feet five inches in diameter. It is built in a hydraulic grade of one in 514, and at the lowest point of curvature it has a gate valve and pipe for flushing, in case of sediment or sand getting in. At the eastern end is a large forbay entering the siphon, provided with a suitable sand-box and gate opening into a spillway cut diagonally to the river and emptying into it at a lower level.

H. W. Fassig of Columbus, Ohio, is the secretary of the corporation.

The company is deservedly making a success of the enterprise, and if any one deserves credit for making two blades of grass grow where but one grew before, an enterprise is then worthy of commendation that makes a fertile field of what was a sterile desert, thus contributing to the comfort and convenience of the miners of Arizona.

THE average number of working days in various countries, according to the *London Engineer*, is as follows: In Russia, 267; in England, 278; in Spain, 290; in Austria, 295; in Italy, 298; in Bavaria and Belgium, 300; in Saxony and France, 302; in Denmark, Norway and Switzerland, 303; in Prussia, 305; in Holland and North America, 308; and in Hungary, 312.

A NEW UNIVERSAL CLOCK consists of a terrestrial globe which revolves once daily over a base divided into 24 hours—12 white and 12 black. The time for any part of the world can be seen at a glance without calculation.

UP IN Maine they are trying the milk cure for the habit of using intoxicants. The patient drinks milk till he is too full to hold any other liquid. The scheme works finely.



BEGINNING OF SIPHON AND FORBAY.

acres, and in Europe about 5,000,000. The United States has about 4,000,000 acres of irrigated lands, and vastly more that is irrigable. This irrigated area is constantly increasing in our country, nowhere more rapidly than in Arizona.

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SPILLWAY, RILLITO CANAL, SANTA CRUZ VALLEY, ARIZONA.



HYDRAULIC GRADE OF 1 IN 514.

Scientific Progress.

Sinking Through Water-Bearing Strata.

M. Gobert has devised an improved method of sinking shafts through water-bearing strata. In the original invention of M. Poetsch, by which most of the difficulty of working in wet "measures" was overcome, the soft material to be excavated was frozen by driving into it pipes through which a freezing liquid was circulated. The temperature of the liquid was reduced by passing it through cooling coils on the surface. The drawback to this method, however, was that the freezing liquid in the tubes was at a pressure above that of the atmosphere, and there was thus a tendency for it to leak out at every weak spot in the tube system. Such leaking prevented the congealing of the adjoining material. M. Gobert's efforts have been directed to securing a system in which the pressure within the freezing tubes would be lower than that outside, and he has succeeded in doing this by the employment of anhydrous ammonia, which is used directly in the tubes instead of the secondary freezing liquid used by Poetsch. The ammonia gas is compressed until it assumes a liquid state, as in the regular ammonia compression refrigerating machines, and is then injected into the freezing tube system, where it evaporates and abstracts heat from the surrounding material. The pressure of the ammonia gas is always lower than that of the outside. The tendency of the liquid, when injected into the freezing tubes, would naturally be to drop at once to the bottom and collect there. In such case the evaporation would be comparatively slow, and the freezing process correspondingly inefficient. To prevent this, the inner tube is made in the form of a worm. This worm is closed at its lower end, and punctured along its whole length with a number of minute holes, through which the liquid ammonia escapes in small quantities, and is rapidly vaporized. By suitably arranging these escaping devices the freezing action may be concentrated at any depth along the line of the tubes. By this system, whenever the strata at the bottom of a shaft is so soft, or so flooded by water that the workmen cannot make headway with their sinking, the pipes are run down, the freezing mixture is forced in, and the part to be excavated becomes so soft that the pick and the shovel become once more effective, and operations can be continued.

How to See Cataract in Your Own Eye.

The following simple method enables a patient to see a cataract in his own eye and note its growth and development, probably better than any oculist can observe it for him:

Cataract is said to be due to the gradual deposition of oxalate of lime in the substance of the crystalline lens, at first in small spots or streaks, sometimes in one part and sometimes in another. The deposit gradually increases until it penetrates the whole of the lens, causing blindness. The remedy, then, is to remove the lens, and after its removal the patient needs a substitute in the form of highly magnifying spectacles.

All that is necessary to enable a patient to see his own cataract for himself is a piece of card and a needle—a visiting card will do very well. Pierce a clean round hole near the middle of the card and hold the card up to the light close to the eye, looking preferably in the direction of a piece of blue sky. With the card near to the eye, the patient will not see the small hole pierced by the needle, but he will see a comparatively large faintly illuminated field with his cataract projected upon it. He is, in fact, observing the shadow cast by his cataract on the retina at the back of his eye. With

a small puncture in the card the shadow so thrown is comparatively sharp. But with a normal eye an evenly illuminated field or clean disk will be seen. The patient may thus map down his own cataract, and settle for himself whether it is extending or not. None of the oculists I have seen have known of the method, and there may, consequently, be some advantage in making it public.—J. S., in Knowledge.

Freezing Alcohol.

The success attending Professor Dewar's experiments in the freezing of absolute alcohol has a peculiar interest, in view of the fact that 200 degrees C. was the utmost limit of cold reached or obtained by man, viz: by the use of liquid oxygen. Professor Dewar allowed some liquid ethylene to flow through a brass tube surrounded by solid carbonic acid and ether, and when this cooled it was passed into a large test tube, with a flattened bulb at the end, the bulb being full of absolute alcohol.

The evaporation of the ethylene was then accelerated by the use of the air pump, and the alcohol was frozen into a mass as clear and transparent as crystal. The tube containing it was turned bottom upward, and as it melted it assumed the exact consistency of glycerine, flowing in a sluggish way down the sides of the tube. Ether requires less cold than alcohol to freeze it, and in several of Professor Dewar's experiments ether ice formed on the sides of the glass vessels. Besides this, the warm air of the theater was constantly condensing as snow or hoar frost on some of the vessels used in the experiments, and the chief difficulty of the occasion was the projecting of the experiments on the screen by the electric light, so that all present might see what was taking place.—Scientific American.

An Alloy of Gold and Aluminum.

During a series of experiments for the Royal Society's committee on researches upon alloys, Captain Hunt has made a discovery that will probably be utilized in the coinage of money. His alloy consists of 78 parts of gold to 22 of aluminum. These proportions, moreover, are the only ones in which these two metals alloy perfectly.

The product, it is said, is of a beautiful purple color, with ruby reflections, and cannot be imitated. Besides, as gold is 7.7 times heavier than aluminum, the same weight of the latter will be 7.7 times greater in bulk than the former.

Utilizing the Central Heat of the Earth.

In an address recently made before the Chambre Syndicale des Produits Chimiques in Paris, Mr. Berthelot proposes to utilize the central heat of the earth by sinking a shaft or shafts to a depth of 4000 meters. At the bottom of these shafts he believes that a temperature of 160° to 200° Cent. would be found and the pressure developed could be used for running machinery. M. Berthelot believes also that at this depth we would reach a source of thermo-electric energy almost without limit.

AN APPARATUS for "converting solar heat into continuous power" has been invented by Melvin Linwood Severy. Machines have been made already in which the sun's rays are reflected on to a small boiler, thus generating steam, but so far they have been mere laboratory toys which will not stand the practical test of steady work. If Mr. Severy's apparatus goes further than this, and proves to be a commercial success, its sphere of usefulness should be almost unlimited.—Chicago Journal of Commerce.

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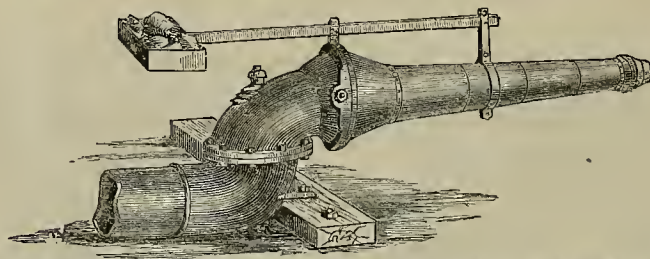
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Mechanical Progress.

The New Army Rifle.

The first consignment of the new army gun, the Krag-Jorgensen rifle, goes from Springfield to the infantry corps at Fort Omaha. The new weapon weighs about eight pounds, including its knife-shaped bayonet. Its barrel is 30 inches in length; its magazine contains five cartridges. It can be used either as a single-shot rifle or as a repeater, and in the former case can be manipulated rapidly enough to discharge 30 shots a minute. One striking characteristic of the arm is its small caliber. The present Springfield rifle has a bore of .45 of an inch; the new rifle one of .30 of an inch only, just about large enough to admit an ordinary lead pencil, and enables the soldier to carry 175 or even 200 rounds of ammunition, instead of 100, as at present. The bullet is about an inch long, of hardened lead, coated with nickel. The charge of 37 grains of smokeless powder burns with little residuum, but smokeless is only a relative term. There is a smoke, or light, feathery vapor, but at a distance it is scarcely noticeable.

At a range of 200 yards it is said to have sent its tiny nickel-clad bullet through 45 inches of poplar planking. At 2000 yards, or considerably more than a mile, it pierced the body of a horse at the shoulders, and would have gone completely through three men. At 2800 yards it pierced four inches of planking, and at 3200 yards it still had force enough to go through a human body. But, while the new arm has developed this terrible power, it is true that at short ranges, at least, it lacks the accuracy of the old-style rifle, and there is some apprehension, too, that its intricate mechanism may not stand the test of hard service on the frontier.

Sweeping with Compressed Air.

One of the most notable of the present century's small inventions is an air pump for cleaning purposes. A hose pipe charged with air under 50 pounds pressure to the square inch is turned upon the article or room to be cleaned. It is used in precisely the same way as the water and the hose for washing purposes. It is far more effective in its result than brooms, beaters or brushes, as it searches out and penetrates every crevice and cleft in woodwork.

This device is at present applied to cleaning cars, but so perfect is its work that it is only a question of time when it will come into use for other purposes. Hotels and large buildings might be swept out and dusted in an incredibly short space of time. Carefully managed, this air pressure would rid the room of every particle of dust, clean furniture, carpets and the heavier articles of bric-a-brac and ornaments. It would do the work of a dozen people.

It is now in order for some home missionary to invent some simple device that will work an air pump and current for household use. Its introduction would revolutionize housekeeping and solve the heretofore hopeless problem of clean rooms, and will keep furniture covers and carpets. It would be economical, as it would render less service necessary and would save a large portion of the wear and tear of furnishing textiles. In houses where there is hydrant water it would not be at all difficult to attach an air pumping apparatus to the kitchen or bath-room faucet, and thus furnish power for every floor.

Some years ago it was said that there would never be an invention that could sweep the dust, but at the present rate of things the problem is practically solved by this simple and easily used device.

At a cost of \$12,500,000 Manchester, England, is just completing a system of water supply by which Thiermere, one of the English lakes in Cumberland county,

95 miles away, has been dammed and water supplied to the city of the best quality in quantities sufficient for all probable needs. The city of Mexico, at a cost of \$10,000,000, is just completing a drainage system that will carry the overflow of the great basin to the sea.

An Alloy Which Adheres to Glass.

M. F. Walter has found that an alloy consisting of 95 parts of tin and five parts of copper adheres so tenaciously to glass that it may be employed as a solder to join the ends of glass tubes. It is obtained by adding the copper to the tin previously melted, agitating with a wooden stirrer, casting or granulating and then remelting. It melts at about 360 degrees C. By adding from a half to one per cent of lead or zinc, the alloy may be rendered either softer or harder, or more or less easily fusible. It may also be used for silvering metals or metallic thread.—Revue Scientifique.

It appears by recent newspaper reports that the Adams-Blair "direct process" of steel making is again attracting attention. This process consists in reducing an iron ore by gas to form a metallic sponge, and using this sponge in the open hearth furnace for steel manufacture. We have no details of the Adams-Blair process as at present operated, and the amount of capital which has been sunk in fruitless and foolish schemes of this sort is not calculated to inspire confidence; but so good an authority as H. M. Howe, in his "Metallurgy of Steel," expresses the belief that the direct process may yet be able to compete with the blast furnace in furnishing material for the open hearth furnace; and the continued commercial success of the Carhon Iron Company, which uses the Eames direct process, and turns a very high grade of steel, seems to show that this belief is not without reasonable foundation.—Chicago Journal of Commerce.

EFFORTS innumerable have been made to overcome the smoke nuisance, and varying successes have been made. Messrs. Braid & Co., 113 Fore street, London, are introducing a very simple grate for the purpose. It really consists of two grates, the one at the top consisting of only two bars, whereas the one below is of the usual size. The bottom grate is filled with coal, while the top one is laid in the usual way, and a light then set to it. The heat works downward and ignites the coal below. There are, in a sense, two fires, the one above the other, which has the effect of causing a consumption of the smoke, so that only a small percentage escapes up the chimney. When the fire above is exhausted, that below working downward has the same effect, with the result that it is estimated that only about ten per cent of the fuel is left unconsumed.

COLONEL DONNETHONE has invented a new magazine gun, for which he claims the following advantages: Greater penetration, lower trajectory, increased storage capacity in magazine, quicker action, simpler construction, lighter and cheaper; and it must be admitted that the tests to which the weapon has been subjected were well sustained. An important feature of the gun is that the center of gravity is preserved whatever the condition of the magazine. As will be seen, the gun possesses advantages which are highly appreciated by soldier or sportsman.

TWO NEW locomotives have been made by the Winterthur Company for running express trains on the St. Gothard railway without changing the engines. One of the locomotives has three cylinders, the high-pressure in the middle, and on the level and easy gradients, it is stated, the steam from the high-pressure cylinder will exhaust into the two outside, while in heavy gradients all three cylinders will take their steam directly

from the boiler. The other engine has four cylinders, coupled two and two, so as to constitute four high-pressure cylinders on heavy gradients, or two compound engines when the traction is easy.

IN A new invention the mechanism is described as a hollow cylinder 10 1/4 feet in circumference, to which the grain of a piece of oak of the width of the cylinder has been transferred, this grain being covered with a soft cement which sinks into the depression, and in these about 200,000 bits of metal-like type are set, above this being placed a small, smooth steel cylinder adjustable to different heights; between the two cylinders, both revolving, a piece of birch, poplar, bass, spruce or maple may be passed which comes out with the grain of the oak transferred to it.

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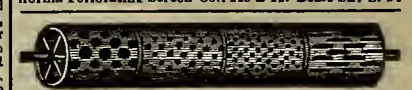


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Electric Progress.

Fatalities Due to Electric Shocks.

After studying and classifying fatalities due to electric shocks, including the executions which have taken place in New York, MM. Biraud and Lacassagne of Lyons announce that electricity causes death in two ways—first, by producing mechanical lesions of the blood vessels and nervous system; second, by stopping the respiration and action of the heart. Deaths belonging to the former class are caused by lightning and static discharges from powerful batteries; but those of the second class are met with in shocks, from high-tension currents used industrially. A French paper, in commenting upon the investigation, takes up the subject at this point as follows:

"These two classes of deaths are distinguished also in practice by a most important fact. While disruptive discharges of the first class cause death absolutely, the electric action in the second case most frequently puts the victims in a state of apparent death, and they can be revived by resorting to artificial respiration immediately after the accident. Thus, in accordance with a principle stated by d'Arsonval, a person who had received an electric shock should be treated exactly as one who has been drowned. None of our skillful physicians have, it is said, succeeded in killing with certainty a luckless rabbit, even by employing a current of 2500 volts and 20 amperes. When the experimenter has believed he has succeeded, it has still artificial respiration. Yet it is questionable if the machines used for electrocution in America give 1500 volts. D'Arsonval some time ago challenged the American doctors to try artificial respiration on the patients immediately after electrocution."

Boiler Incrustation.

The frequency of troubles with steam boilers, especially those used on sea-going vessels, caused by incrustation and corrosion, has been a source of so much expense for making repairs, to say nothing of delays, that every process suggested to minimize the difficulties is given special attention. There have been compounds upon compounds used to prevent these decays, and some have been found to be good and some otherwise; and few, if any, have been tried that have not injured in some way the internal surfaces of the boiler. A novel method, called an enamelling process, has been the subject of careful investigation and practical experiment, and is reported to have given good results. The method consists in the coating of the interior surfaces with a deposit in the form of a smooth, black film or enamel, similar to an electro deposit, thick enough to protect the metal underneath from corrosion, and so thin that the boiler loses none of its steam-generating power. The application is simple, the process material being injected into the boiler through a cock of lubricator pattern at such times as desired, and the surface below the water level thus becomes coated with the enamel. The makers claim for the process that the enamel is impenetrable by acids, it protects the boiler from the corrosive agents contained in almost if not all waters, it prevents incrustation, and does not injure the boilers. It is also claimed to be inexpensive, is convenient of handling and effective in its purposes.

Effect of the Trolley on Watches.

A great many men are wondering what is the matter with their watches. Never since the town was a town have there been so many pocket timepieces taken in for repairs. The trouble lies in the trolley. The introduction of the electric wire for propulsion, making the car stop and go fast or slow, affects the average watch in a similar manner,

and fortunate is the man who gets off a trolley with his watch in the same condition that it was before. He may catch a train or reach bank in time to pay a bill, but it will be by town-clock time, not his own. Every watch thus affected has to be demagnetized. —Philadelphia Times.

Windmills for Generating Electricity.

An English engineering company is conducting, upon an extensive scale, the charging of electric storage batteries by the use of windmills. The motor consists of a set of five curved vanes (measuring 7x20 feet each) attached longitudinally to a vertical shaft. A shield is so arranged as to permit the wind to strike only such vanes as present their concave surfaces. This shield moves automatically into the proper position. The mill is of 20 feet horizontal diameter, and supported 30 feet in the air by a strong iron frame. Friction rollers operating in oil baths take care of all the working parts of the apparatus, including the side thrust produced by the wind pressure. This alleviation of friction allows the mill to actuate in a very light breeze. With say a seven or eight mile per hour wind velocity, two-horse power may be generated. In a certain English town a motor of this description operates a five-horse dynamo, being connected thereto by belt gearing. The dynamo mentioned is utilized in the charging of accumulators, the latter producing a current available for lighting or power purposes.

Ocean Cables.

A new 2200-mile cable is to be laid from Halifax, N. S., to England. This, with the two now in process of submergence, makes twelve cables between America and Europe. The original 1858 cable weighed 93 pounds per mile and had a conductor of seven copper wires of 22½ gauge. Price of deep-sea wire per mile, \$200; price of spun yarn and iron wire per mile, \$265; cost of outside coating of tar and gutta-percha, \$25 per mile; total cost per mile, \$485. At \$485 per mile the total cost of the 2500 miles of deep-sea wire was \$1,212,500. To this add 25 miles of "short-end" wire, costing \$1450 per mile, and we find that the first ocean cable, exclusive of instruments, cost \$1,250,000. Cables can now be made and laid for less than \$300 per mile.

DR. OCHSE'S new electrolytic cartridge for shot firing in mines is composed of an ampulla of very thick glass filled with slightly acidulated water, into which penetrate two small platinum electrodes connected with two copper wires. It is placed at the bottom of a mine, which is afterward rammed in the usual way. The water on passing the electric current is decomposed into oxygen and hydrogen, and these two gases form a detonating mixture which explodes, we understand, at about 400 or 500 degrees C. The cartridge is described by M. Chalon in a recent number of *Le Genie Civil*.

AS THE outcome of his many experiments on the phenomena of the electric arc, M. Violle thinks he has established the fact that the carbon in the arc is always in the state of ebullition. It is well known that the temperature of a substance in ebullition is always constant, and this therefore, would account for the constancy of temperature, and hence of brightness, in the arc.

A SPECIAL MOUTHPIECE for public telephones is being introduced in Germany, with the object of avoiding the spread of diseases carried by the condensed moisture of the breath. A pad or a large number of discs of paper, with a hole in the middle, is inserted in the mouthpiece, and the upper disc of paper is torn off after every conversation.

Practical Information.

Return of a Celestial Wanderer.

Halley's comet is coming back—the comet which in the year 1066 shed a celestial splendor over the Norman conquest and whose terror-inspiring visit was commemorated by the hand of Queen Matilda in the Bayeux Tapestry; the comet that in 1456, the year of the battle of Belgrade, scared Turk and Christian alike, and was anathematized by a bull from the Pope; the comet whose strange scimitar form still chilled the marrow of the ignorant and superstitious at its latest return in 1835. It is yet far away, says a writer in the *New York Sun*, but the eyes of science see it, already within the orbit of Neptune, rushing sunward and earthward with constantly increasing velocity as it falls along the steep curve of its orbit. And a call to arms, a call for preparation, has just been issued from one of the chief watch-towers of astronomy.

Halley's comet is not one of the insignificant crowd of little comets, so many of which are discovered by industrious stargazers every year, and which nobody outside of the observatory ever sees. On the contrary it furnishes, or at least has done so hitherto, a splendid spectacle in the sky. Of course in speaking of ordinary telescopic comets as insignificant I refer only to their apparent size and brilliancy; in a scientific sense they frequently possess the highest interest and significance. But Halley's comet is one that, when favorably situated, commands every eye, and does not need to be looked for. During at least eighteen centuries it has periodically astonished the inhabitants of the earth. In 1456 its tail was 60 degrees long. In 1835 it had a tail 20 degrees in length.

It was after its appearance in the time of Newton, in 1682, that the fact came to be recognized that this comet is a regular visitor to the neighborhood of the sun; in other words, that it travels in a long elliptical orbit. When nearest it is about 56,000,000 miles from the sun, and far inside the orbit of the earth; when most distant it is about 3,370,000,000 miles from the sun and beyond the known limits of the planetary system.

Now that astronomers have undertaken the prediction of the exact period of its return it will be interesting to see who will hit nearest to the mark. All those of us who actually see the great comet on its return will surely find it doubly interesting, because it is like a slowly revolving hand upon the dial of history. It passed across the sky twice twelve years before the birth of Christ. It passed again when Nero was Emperor; again when the first of the Antonines had just begun his pacific reign; again when the Goths were preparing to attack Rome, and yet again in the days of Diocletian. The advancing Huns beheld its transit in the year 373, and it was blazing in the sky when the great King Attila was defeated at Chalons in 451. Belisarius may have watched it as it swung across the heavens just after he had begun his victorious career in 530. It passed again when Mohammed was still worshipping the idols of his fathers in 608. The world saw the great index in the firmament again in 684, in 760, in 837, in 912 and in 989. It was on the noon mark for William the Conqueror in 1066. It returned in 1145; in 1223 it was thought to have predicted the death of Phillip Augustus; in 1301 it was watched with astonishment from Iceland to China; in 1378 Chinese and Europeans once more recorded its transit in their annals. We have seen how Islam and Christendom were terrified by it in 1456. It was back again in 1531 and 1607, and when in 1682 it shone once more in the sky the man had come who was to read its riddle and solve its mystery.

Is it possible to look forward to the re-

turn of a comet having such a history as this without feeling that the proper field of human interest is not limited by the narrow round of the earth?

The Compass Plant.

"Among the many wonders of the Western plains," said Garrett C. Hughes of Boulder, Colorado, "nothing strikes the traveler of a scientific turn of mind with more surprise than the 'compass plant.' The leaves of this singular plant are magnetic and its petals point constantly to the north. These wonderful prairie guides have on numerous occasions proved to be an inestimable benefit to travelers who strayed away from their camp and companions and found themselves lost on the plains. In 1860, while on my way to the Rocky mountains by a wagon train, a party of us, who had left camp on a hunt for antelope, lost our way owing to a dark, stormy night overtaking us. We knew that our train was camped about ten miles to the northwest of where we were thus overtaken. The night was as dark as pitch, and we were beginning to be alarmed, when one of our number happened to think of the compass plant and its singular peculiarity. We at once dismounted and groped about in the dark till at last our hands came in contact with the familiar leaves of the plant. It was but a short calculation till we turned our horses' heads in the right direction toward the camp, which we had the satisfaction of reaching in about two hours, but not until we had dismounted several times to feel among the leaves of this friendly guide to make sure of our course."—St. Louis Globe-Democrat.

The New Battle Ships.

The naval stability board has completed and submitted to the Secretary of the Navy its report upon the stability of the battleships Indiana, Massachusetts and Oregon. Practical heeling or inclining tests were made to ascertain the behavior of the vessels under all possible conditions of load. The result is highly gratifying to the department, for it justifies in all respects the designs of the vessels, and shows that they are superior to any warships afloat of corresponding size. The calculations of the bureau of construction, when the designs of the vessels were completed, showed that they were to have, with 400 tons of coal aboard and all weights, a total estimated weight of 10,093 tons. The actual weight or displacement was 10,162 tons, a variation of only two-thirds of one per cent. The designed draught was 24 feet; the experiments show that it is actually from 23 feet 11 inches to 24 feet. The excess buoyancy was to be 195 tons; it was actually 126 tons. The metacentric height was to be 3 feet 5½ inches; it was 3 feet 4¼ inches.

A Curious Formula.

The following formula will enable you to determine the day of the week of any date: Take the last two figures of the year; add a quarter of this, disregarding the fraction; add the date of the month, and to this add the figure in the following list, one figure standing for each month, 3-6-6-2-4-0-2-5-1-3-6-1. Divide the sum by seven, and the remainder will give the number of the day in the week, and when there is no remainder the day will be Saturday. As an illustration, take May 10, 1894. Take 94, add 23, add 10, add 4. Divide the sum by 7. The remainder is 5, and the day is Thursday. Or take to-day, add 94, 23, 9, 0. Divide the sum by 7. There is no remainder, showing the day to be Saturday.

WHERE telephone wires are overhead the speed of transmission is at the rate of 16,000 miles a second; through cables under the sea the speed is not more than 6000 miles a second.

Silver Dollars and Silver Bullion.

The purchasing clause of the Sherman Act called for the purchase by the Government of 4,500,000 ounces of silver bullion each month at the current or market price. This was paid for by the Government in special treasury notes. As the price of the bullion fluctuated, the volume of these notes was never the same any month, although the amount of bullion purchased each month was practically the same. From July, 1890, until the repeal of the Silver Purchasing Act, something less than \$154,000,000 of these special treasury notes were issued, and the great mass of silver bought therewith now lies in the Government vaults. The bullion would coin 209,000,000 of our present silver dollars, which contain each 371.25 grains of pure silver. The bullion value of our silver dollar averaged 81 cents during 1890; 76 cents in 1891; 67 cents in 1892, and ran down to about 60 cents in 1893, and has averaged less than this during the first five months of the year. At the present market price of silver bullion the \$154,000,000 treasury notes issued to buy bullion in 1890-91-92-93 would purchase enough to coin about 300,000,000 standard silver dollars. The bullion on hand will coin \$55,000,000 standard silver dollars in excess of \$154,000,000 treasury notes issued to purchase it. The act authorizing the purchase of this bullion gave the Secretary of the Treasury power to coin it, and the notes issued for its payment were made redeemable in either gold or silver. Running at full capacity it would take the Government months several years to coin all this bullion into dollars. The Bland bill, which passed Congress and was vetoed by the President, intended to expand the circulating paper currency represented by this mass of silver from the outstanding issue of treasury notes to an amount \$55,000,000 greater, by treating the whole of it as if it were a deposit of coined silver dollars, for each of which a corresponding paper dollar should be sent out.

That Defective Armor Plate.

The defective armor plates shipped by the Carnegie Company to the National Government have been the cause of considerable gossip, and the usual newspaper cataract of mud and abuse. Conjecture has had the usual free use of printers' ink, and animosity has had a delightful opportunity to prejudice public opinion. Facts have been manufactured like bottles, to be on sale to-day and broken to-morrow. Truth, like the traditional needle in a stack of timothy, has been hard to find, and until this is located, all prejudging and conjecture is simply on par with guessing the number of peas in a pod. To any fair-minded man it is not reasonable to suppose that the Carnegie Company would connive at tricking the Government and jeopardize their reputation and honesty by a few defective plates. This would be selling Esau's birthright for less than a mess of pottage. That a trick has been played on the company for purposes of revenge is possible, yet not fair to assume without evidence. It may rather turn out to be an instance of oversight or carelessness. Investigation will probably remove the skin from the sore. It is, however, by no means commensurate to the manners of the times that even a national reputation is no protection against scandal mongers, rogues, conspirators or even such small fry as the political or commercial sucker.—Age of Steel.

New Naval Militia Flag.

The Secretary of the Navy has approved a design of a special flag for the naval militia. It has a field of blue, in the center of which is a division of yellow showing a blue anchor. This flag will be displayed on all warships engaged in naval militia drill and will be used by the militia of the various States.

No. 4.

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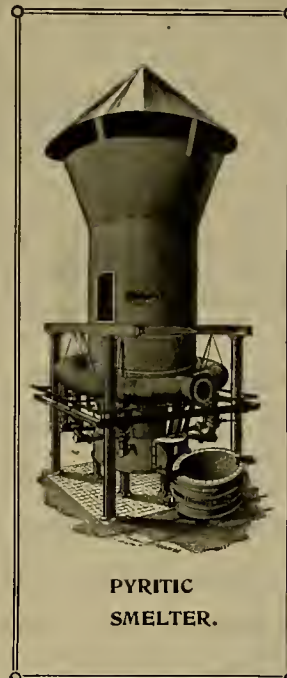
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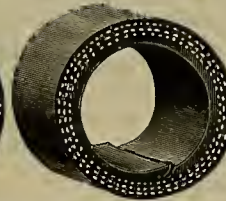
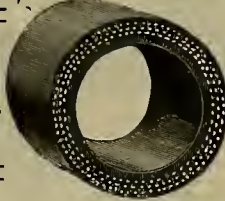


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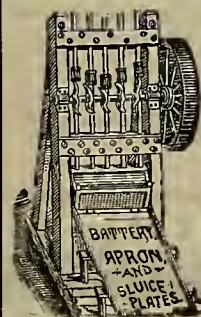
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The Railroad Track Improvement Company. Principal place of business, Oakland. Capital stock \$1,000,000, with Ell S. Dennison, A. D. Starr, J. T. Carothers, Charles L. Pierce, C. S. Kennedy, C. L. Dam, A. K. Grim, R. W. Baxter, R. K. Dnnn, George B. Seaman and D. C. Brown of Oakland as directors.

The Cosumnes Water Company. Principal place of business, San Francisco. Capital stock \$1,000,000, with E. G. Wheeler, C. E. Grosjean and Charles Orpen of San Francisco, E. L. Fitzgerald of Berkeley, and F. L. Van Meter of Alameda as directors.

The New Electric Power and Light Company. Principal place of business, San Francisco. Capital stock \$10,000,000, with Frederick Dnbero, Peter Mohrdick, Emil Lless, Gustav Liebold and F. J. Castelhorn of San Francisco as directors.

The Fifth Wheel Company. Principal place of business, San Francisco. Capital stock, \$60,000, with Victor D. Duhoce, Chas. R. Johnston, C. S. Benedict, H. T. Lally and Lester H. Jacobs of San Francisco as directors.

The California Elixir Mineral Spring Water Company. Principal place of business, Los Angeles. Capital stock \$100,000, with James D. Reynert, Anna M. Johnson, J. W. Trueworthy, M. D., C. H. McLaughlin, M. D., and James C. Brown of Los Angeles as directors.

The Hanford Publishing Company. Principal place of business, Hanford. Capital stock, \$10,000, with James Robinson, A. M. Squire, H. Skilling, William Norton and Archibald Yell of Hanford as directors.

The Minneola Land and Town Company. Principal place of business, Los Angeles. Capital stock, \$100,000, with C. N. Loucks, G. B. Mler, L. M. Holt, Wm. Dieterle and A. N. Hamilton of Los Angeles as directors.

Goldstein & Cohn. Principal place of business, San Francisco. Capital stock, \$20,000, with Simon Goldstein, Herman Cohn, Anton Morgenthal, Margaret Goldstein and Eva Cohn as directors.

The Expositor Publishing Company. Principal place of business, Fresno. Capital stock, \$37,500, with J. W. Ferguson, Aaron H. Powers, Jr., Henry W. Clinch and Sam C. Hutchings of Fresno, and Frank H. Powers of San Francisco as directors.

The Bullock & Jones Company. Principal place of business, San Francisco. Capital stock \$60,000, with Edward Mills, A. J. Mills, F. Gaudin and C. M. Gaudin of San Francisco, and H. V. Ramsdell and A. E. Ramsdell of Alameda as directors.

The Alhlon Mercantile Company. Principal place of business, Alhlon, Mendocino county. Capital stock, \$15,000, with J. L. Corrigan and Emma Corrigan of Little River, George G. Wilcox of Chicago, Ill., M. D. Gray of Whitesboro, Henry B. Hickey of Alhlon, and Miles Standish of Oakland as directors.

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cipal place of business, Visalia. Capital stock \$30,000, with D. G. Overall, C. J. Giddings, H. C. Ray, Wm. H. Hammond and E. D. Miller of Visalia as directors.

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George Gould says it is because of the hostility to corporations.

The farmer says it is the low price of wheat.

The silver men say it is the action of Wall street.

Wall street says it is the action of the silver men.

The manufacturer says it is the fear of free trade.

The consumer says it is the tariff.

The capitalist says it is the exorbitant demands of labor.

The debtor says it is the creditor.

The creditor says it is the debtor.

The Democrat says it is the Republican.

The Republican says it is the Democrat.

The Populist says it is both.

The Prohibitionist says it is whisky.

The preacher says it is the devil.

What do you say? or don't you know?—Canadian Recorder.

Golden Relics in Mexico.

In one of the oldest ruins in the State of Oaxaca, Mexico, a number of very rare and interesting images, found in metal, have been uncovered. The images represent people of oriental appearance and dress, as well as priests in their robes of sacrifice. They bear hieroglyphics of unknown characters and are elaborately wrought, with fine art lines shown in every curve. The images found thus far are of gold, either wholly or in part, and are coated with some unknown enamel, which has preserved them from all harm in the many years they have been buried in the soil.

AN INQUIRY was last year sent to the astronomers of different countries concerning the desirability of beginning the astronomical day at midnight on and after January 1, 1901. The present reckoning from noon to noon, 12 hours behind the civil day, has serious disadvantages. The change was favored in 107 replies and opposed in 63.

SYLVANITE is a native telluride of gold, silver and sometimes lead. It occurs crystallized and massive, of a steel-gray to silver-white color and brilliant metallic luster. The crystals are often so arranged in parallel position on the rock surface as to resemble written characters; it is hence called graphic tellurium or graphic gold.

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SAN ANDRES, DURANGO, MEXICO, March 20, 1894.
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Mining Summary.

The following is mostly condensed from journals published in the interior, in proximity to the mines mentioned.

CALIFORNIA.

Amador.

Regarding the famous Gwin mine, which up to twelve years ago had paid \$2,000,000 in dividends, the *Amador Ledger* says: When it had been worked to a depth of 1500 feet there was a cave in the shaft, and ever since the great mine has been untouched. F. F. Thomas, the chief promoter and stockholder of the company which is to reopen the mine, has 20 men on the preliminary work, and as soon as this is done a new shaft will be started on lower ground and sunk 1400 feet, opening the vein to a depth 300 feet below the old workings.

ENTERPRISE.—*Record*: The superintendent of the Bay State mine reports that since starting the crosscuts at the four and five hundred levels two stations have been cut. No. 5 crosscut has been run a distance of 35 feet, and No. 4 crosscut is in 32 feet, with ground of the same character in both crosscuts as met with in the shaft. The track in the shaft has been fixed for the skip, and is now in good working order. The pump is working satisfactorily, making but one stroke in one and one-half minutes, and raising the small quantity of 13 gallons of water per minute. The contractors are bearing every energy for the final completion of their contracts, which is looked forward to with increased interest as they near the great footwall ledge. If this idea is correct, this will be the objective point on the mother lode of Amador county, as this is the first development made north of the great bonanza mine of Plymouth.

The shaft of the Pioneer mine at Plymouth is down 300 feet, and about 120 feet below the drain tunnel, and although the ledge is small it is remarkably rich. It is the intention of Dr. Boyson, the owner of the mine, to open a station and run crosscuts in the near future, and if the development proves satisfactory he will erect a 10-stamp mill right away.

Butte.

RICH STRIKE.—*New Era*: A rich strike has been made in a new ledge owned by the Denver Company, Messrs. Price & Lane. The rock, it is said, will mill \$40 to the ton, and there is considerable of it in sight. The new discovery was made about a quarter of a mile from the mill, but the ledge is so situated that the ore can be delivered to the mill at very little expense. The Denver is considered one of the best mining properties in the Forbestown district.

Mono.

The Bodie *Miner* says: "It is confidently expected that Bodie will be a better camp during the summer than it has been for several years, and business men generally seem to take a hopeful view of the outlook. Bodie has enriched the world to the extent of \$20,000,000 in gold, and there is a lot more of the yellow metal stored away in the hills. It is only a question of time when it will be extracted and added to the rushing marts of trade."

Nevada.

FOUND THE LENOE.—*Herald*: Prof. T. B. Gray, who is having the old Buckeye mine in Willow valley put in shape for working, has found the ledge. It is a large vein and looks pretty good. Some 30 years ago the mine was worked and some 1000 tons of rock were taken out and milled. It is said to have run all the way from \$7 to \$45 a ton. Prof. Gray believes the Buckeye to be a true fissure vein. It is in porphyry, on the slate and granite contact.

STRUCK IT RICH.—*Herald*: John Fippin of Rough and Ready has had a test crushing of rock from the Fippin mine made at Locklin's mill, in this city, which yielded \$191.70 per ton. How is that for a mill test? Mr. Fippin discovered this ledge on April 23d. He has sunk ten or twelve feet, and now has a ledge ten inches wide. He struck water at that depth. Considerable prospecting is being done around Rough and Ready this year, and Mr. Fippin's strike will give it a new impetus. Both the Mistletoe and Osceola mines are likely to change hands soon, in event of which it is understood that machinery will be put up and some real mining done. Rough and Ready was a flourishing mining district once, and, like many others, it may come to the front again. Residents say that it would pay some one to erect a custom mill there. An express office is also needed.

Grass Valley Union. The directors of the Badger Hill quartz mine have decided to put a new pump at work and to push work as fast as possible. There is a good ledge varying from one to two feet in size, which averages over \$20 per ton, exclusive of sulphurets. It is contemplated to erect a mill on the property before long. Paul Quick Jr. of this city has gone to Badger Hill to superintend operations.

Grass Valley Telegraph. Supt. J. A. Conlon let a contract for sinking the shaft at the Conlon mine and work will be commenced immediately. The shaft is now down 200 feet and the company intend sinking it 300 feet deeper without stopping. John McLaughlin and party secured the contract. The location of the mine is good, being on Osborn Hill, surrounded by fine mining properties. The company intend to see the bottom of it.

Saturday, the result of the sulphurets cleaned up by Mone. Colliot, from the last crushing made on Wisconsin rock, was favorable indeed. There were 21 tons of sulphurets saved, and the result was that they paid \$110 per ton, or \$2310. The miners who have the mine leased say that it is looking well.

Herald: The Mineral Hill Mining Co., whose mine is located at Mineral, about three miles thence of Spenceville, are preparing for their

new smelting plant, which is now on its way out from the East. By their improved method of smelting they expect to save all the gold and silver in the copper ore, and as a guarantee that the machinery will do this the company is to be allowed to run the plant for 30 days on trial.

The Jackson Mining Co., whose claim adjoins the Mineral Hill, is taking out rich ore, and the latter company has signed a contract to take 100 tons per month from the Jackson, for reduction, said contract to begin June 1st. If Mineral Hill turns out well, things will be lively down there this summer, as both mining companies own valuable property and are able to work their mine to their fullest extent.

Placer.

GOON PROSPECT AT DUTCH FLAT.—*Colfax Sentinel*: During the past week some good gravel has been struck in the shaft sunk at the lower end of the town of Dutch Flat. The shaft is down 87 feet, and bedrock was struck at about 83 feet. A drift is being run toward the east, in which direction the bedrock is pitching. Last Friday, good prospecting gravel was found at a distance of about 30 feet from the shaft. A cleanup of the gravel taken out during the past week was made Tuesday of this week, and although a greater part of the dirt washed consisted of bedrock, it went a dollar a carload. The gold is all regular coarse channel gold; and if there is much of a channel of it, old Dutch Flat will once more become a lively mining town. The indications at present are very favorable, and the prospecting work is being pushed ahead as rapidly as possible. The gravel is blue and in some places is cemented. The bedrock is still pitching, and it will be some time before the true nature of the channel will be known.

Columbus Waterhouse of the Big Dipper mine, in response to a query concerning affairs at the mine, said they had recently added about 25 men and were running two breasts. They expect to open a new breast this week, which will necessitate the addition of 15 or 20 new men to the force now employed.

Plumas.

NORTH FORK MINING NEWS.—*National Bulletin*: The King mine, owned by Fred Scott, continues to produce large returns from the ground being extracted.

Adjoining the King mine is that owned by Angus Cameron. It embraces about 3300 feet of the ancient channel running through Big Flat. Mr. Cameron tapped it with a tunnel at a point about 500 feet from the mouth of the tunnel, and after he had made an upraise of 36 feet. This is at the lower end of the channel, which has been cut across and found to be 70 feet wide from rim to rim. Mr. Cameron is getting considerable gold from the gravel which is now being extracted.

The Glazier mine has been bonded by Dr. J. P. Welch, and it is understood that he will tap the channel with a tunnel at the lower end of the claim. It is estimated that this tunnel will be between 400 and 1000 feet in length.

Lee, McMullen and Bamrick are preparing to wing-dam the river below the Wildcat to work the present river channel.

Harry Ratford is taking out some money at Bamboo.

Dick White will wing-dam the river and resume work on the claim from which he has taken considerable gold during the past three years.

Leinbart, Mori & Akile will start to work on the Kirkham claim as soon as the water becomes sufficiently low. They have the property leased of Savercool & Duryea.

Mandeville & Co. are driving a tunnel on the Cub quartz mine. They are also prospecting a quartz discovery lately made by them near the Dick White claim. This Mr. Cameron considers one of the best quartz prospects in the country. It is about 400 feet above the present river bed. The ledge is three feet wide and the quartz is high grade. If at a depth it proves of the same quality as that near the surface, it will certainly become a big mining proposition.

Joe Boreini & Co. are at work in the Bunker Hill gravel mine, which is paying them \$3 per day to the man.

Opposite Marion Flat, Geo. Scott is operating a gravel mine, which is paying from \$4 to \$6 per day.

At the lower end of Yankee Bar, Stephen Dean is fitting up a claim to be worked with a derrick.

Shasta.

Democrat: Six carloads of lumber for the Quartz Hill Mining Co. are being unloaded at the depot. The Quartz Hill Co. is doing an immense amount of development work on the mine.

Siskiyou.

Yreka Journal: The Van Vactor & Staples mine on Hungry creek has developed into a splendid property, being an eight-foot ledge, with \$20 rock free gold, five per cent sulphurets, that goes \$490 per ton. It would take a big sack to buy it now.

The district known as Fool's Paradise, between Shasta and Klamath rivers, is coming to the front as a mining camp, a recent discovery being bonded for \$10,000. A corporation has been formed, to be known as the Fool's Paradise Prospecting, Mining and Improvement Co., with the object of developing properties in that new camp. B. G. Reeder, president; E. L. Hall, vice-president; W. B. Edmundson, secretary; Charles Bennett, treasurer; Franklin Howland, cashier; A. B. Jenkins, general manager and superintendent.

Trinity.

MINING DEAL CONSUMMATED.—O. M. Loveridge has bought the Lappin property, a few miles from Minersville. The property consists of a main ditch of five miles in length and branch ditches of about fifteen miles, together with water rights which virtually control all the mining around in this vicinity; in fact it is the

key of the entire situation around this camp. The diggings of Mule creek, Strophe creek, Digger creek and Greenhorn, with numerous gulches and thousands of acres of aridiferous gravel, are covered by the waters included in the purchase and upon which they depend. The purchaser will take possession on the 1st of October.

Tuolumne.

MINING NOTES.—*Independent*: Mr. Chute is actively engaged in developing his Rappabannock mine. His shaft is sunk 22 feet. The slates intersected are black metallic and the vein matter is coming in. We hope soon to chronicle a rich strike. The county surveyor, Carroll McTarnahan, has been making surveys for water power and locating the lines on Mr. Chute's vein lands, which he has acquired by United States patent. This is a valuable adjunct to his property.

The old Joe Hooker mine, near the Parole, which has been shut down for years, will shortly commence active operations. A new two-compartment shaft has been sunk about 200 feet from the old works, and is now about 45 feet deep. The owners are awaiting their new engine, which is expected this week, when the work of sinking will be resumed. The country rock being soft, the miners are able to make rapid progress. The carpenters have completed a new gallows frame, in addition to other work done on the mine.

The Parole mine, situated at the head of Sullivan's creek, is now running at full blast. A force of men, working day and night, is making rapid progress. The hoisting works, blacksmith shops, etc., are completed and ready for use. The water in the old shaft, which is 100 feet deep, has been taken out and levels run at this depth on the vein, about 40 feet both north and south. The owners of the property are hopeful of the best results.

The Rawhide is getting the water, which has been a great annoyance of late, under control, and will soon commence active operations in the mine.

The Alameda crosscut is being rapidly pushed ahead to the footwall. Good milling ore has been intersected, and the best of results are anticipated.

We understand the Tarantula, on the mother lode, is likely to change hands in a day or two.

NEVADA.

Washoe District.

Following are copies of the official letters of Comstock mine superintendents filed at the companies' offices:

CON. CAL. & VIRGINIA.—1650 level.—From the top of the south drift No. 1, on the sill floor of this level, in the ore body recently found, an upraise has been carried up 6 feet and this opening has been extended out to the east a distance of 6 feet—all in ore of high grade, with signs of lower grade ore in the top. The south drift No. 3, 26 feet under the south drift No. 1, has been extended 9 feet, the first five feet in ore which will average \$50 per ton. The length of this drift is 35 feet, of which 31 is in ore. The face is in quartz with some porphyry carrying a low assay value. At the mouth of this drift an upraise has been carried up and connected with the south end of the south drift No. 2—in ore of good quality.—The south drift No. 4—in the 1700 level—has been opened and repaired to a point 112 feet distant south from the winze.

The ore extracted during the week amounted to 67 carloads—about 66 tons—the average assay value of which (per car samples) was \$95.42 per ton. The largest portion of this ore came from the south drift No. 3 and the remainder from the opening above the south drift No. 1.

On the 1000 level—the Rule drift.—From upraise on the east side of the main drift at a point 585 feet south from the shaft station, at a point 95 feet up, a northwest drift has been advanced 38 feet; and from this drift at a point 20 feet in, a west crosscut has been advanced 15 feet; face in porphyry. The west crosscut from the main drift, 370 feet south from the shaft station, has been advanced 50 feet; total length 95 feet. At a point 235 feet south from the shaft station, an east crosscut from the main drift has been advanced 23 feet; face in porphyry carrying lines of quartz.

UNION MINA.—900 level.—The Union Con. and Sierra Nevada joint north drift which was run from the joint west drift at a point 1520 feet west of the shaft, has been extended during the week 11 feet; total length 404 feet; face in hard porphyry. The joint south lateral drift from the joint west drift, at a point 1520 feet west of the shaft, has been extended 21 feet; total length 31 feet; face in clay and porphyry.

MEXICAN.—1465 level.—From the top of the upraise which was carried up 45 feet above the sill floor of this level at a point 40 feet west from the main north drift and 100 feet north from the south line of the mine, a west crosscut has been advanced during the week 25 feet; in porphyry and etreake of quartz of nominal value.

As joint work with the Ophir Company, making repairs in the incline shaft which extends downward from the 1465 level station of the Ophir shaft.

OPHIR.—1465 level.—The drift run south from the crosscut run west from the main north drift, at a point 219 feet in from the mouth of the crosscut, has been extended during the week 14 feet; total length 134 feet; in a porphyry formation carrying lines of quartz of low assay value.

Have continued jointly with the Mexican Company the work of making repairs in the incline shaft, which extends downward from the 1465 level station of the Ophir main shaft.

CENTRAL TUNNEL.—The west crosscut started from the drift run north from the old Mexican shaft on the tunnel level has been extended 29 feet; total length 50 feet; continuing in porphyry and clay. From the drift run north-

weeterly from the shaft, 56 feet above the tunnel level, at a point 60 feet from the shaft, a west crosscut has been advanced 50 feet; face in porphyry.

SAVAGE.—On the 1050 level east crosscut No. 1, started in the north drift, at a point 45 feet from the station, was advanced 10 feet, making its total length 70 feet; face in ledge formation. Finished repairing and retimbering the main south drift on this level. The upraise from the north drift is advanced 48 feet; top in quartz giving fair assays. On the 1100 level west crosscut No. 2, started from face of the north drift, was advanced 18 feet; total length 32 feet. We are repairing the main south lateral drift on this level. During the week we have hoisted 26 cars of ore. Car samples average \$27.75 per ton.

HALE & NOACROSS.—900 level.—Advanced southwest drift 5 feet; total length 259 feet. Have started a west crosscut from the end of this drift and advanced the same 5 feet; face in porphyry.

1100 level.—East crosscut from the end of main south drift was advanced 10 feet; total length 33 feet; the face is in porphyry. All work was stopped at the mine for one day the past week.

ANDER.—420 level.—The upraise from the west crosscut that connects the north lateral drift with the main north drift has been carried up 8 feet; total length 34 feet; formation quartz and porphyry.

BAST & BALCHER.—200 level.—Have started on our northwest boundary a northwest drift, 1115 feet from main northwest drift, and advanced same 14 feet, passing through porphyry and quartz giving low assays; total length 30 feet. 800 level.—Northwest drift, started in crosscut in west crosscut No. 2, 415 feet from main north drift, has been extended 12 feet, passing through quartz and porphyry; total length 33 feet.

GOULD & CUNAY.—On the 200 level west crosscut No. 5, 1115 feet from northwest drift, have started a drift in a face of quartz and advanced the same 15 feet. All work has been discontinued in face of west crosscut No. 5.

OCCIDENTAL.—From the west ledge above the 400 level we continue to extract about 8 tons of ore per week of the average assay value of \$12 per ton, as per car sample. Milled during the month of May 132 tons of ore and slimes, and produced bullion valued by assay at \$2428.34.

KENTUCK.—The south drift from the east crosscut on the 1035 level is in 60 feet and continues in quartz with spots of pay ore. The south drift from the Yellow Jacket incline has been extended 8 feet; total length 100 feet; face in low-grade gold ore.

ALTA.—We have finished the winze station, and sinking was commenced this morning. The south drift from the north raise has been extended 14 feet; total length 80 feet. There is 10 or 12 inches of fair-grade ore in the face. The average value, according to car samples, is \$33.62 per ton.

IOWA.—During the past week—sinking winze in fair-grade gold ore.

WEST CON. VA. & CAL.—During the past week the west crosscut run from a joint 320 feet north of the shaft station on the 1100 level, has been extended 31 feet, and is now in a total distance of 870 feet. The flow of water has somewhat increased. The face is in quartzite of a softer nature, carrying seams of porphyry and quartz.

ARIZONA.

A FINE SHOWING.—*Record*: The Harqua Hala Gold Mining Company Limited of Arizona is making a fine showing. The superintendent reports as follows: The mill started on March 31st, when it was shut down for the cleanup. The following figures represent the month's operations: Ore crushed, 2928 tons; amalgam cleaned up (estimated), \$37,000; working expenses, revenue account, \$10,400; estimated profit for the month, \$26,600. To this is added \$1472, the net yield from amalgam and coarse gold from bar No. 4, November account, and \$3000 from profits from general store for six months ending March 31st. The average loss in tailings was \$2.69 per ton.

Tombstone Epitaph: Claude Blimbangh came down from Tip Top, a mine near Phoenix, recently with a nine-hurro train laden with rich concentrates from Fred Blumb's mines. The value of the cargo was placed by guesswork at \$100,000. The concentrates were shipped to the smelter at El Paso.

THE UNITED VANAS MINES.—The *Journal-Miner* publishes an extended description of the United Verde Copper Company's mine and plant at Jerome. The mine is said to be one of the largest and richest bodies of ore in the country. The reduction plant consists of three water-jacketed furnaces and one reverberatory furnace, with an actual aggregate capacity of 250 tons daily. Another 150-ton furnace and three converters are to be added this summer. The ore has first to undergo a roasting process, which requires from six weeks to three months. There are 15 miles of 18-inch gauge railroad in operation. The bucket tramway has finally been made to work satisfactorily for a distance of five miles with one transfer station. The offices, smelter and a portion of the mine are lighted by electricity. A larger electric plant is to be put in to light the mines and town of Jerome, and run portions of the new machinery. The mine will also be equipped with a large and powerful double-compartment hoist, the machinery for which is now on the ground.

COLORADO.

STRIKE OF SYLVANITE.—Colorado Springs *Gazette*: As nearly metal as sylvanite ore can be when found in quartz is the character of some of the stuff taken from the Gold Dollar mine, on Beacon Hill, in the last three days. In the drift at the bottom of the shaft 85 feet from the surface an upraise was started on

Wednesday. It was noticed that with each foot the quartz improved in grade and everybody about the property was in great glee; but glee was turned into ecstasy and joy when a piece of sylvanite two inches thick, several inches long and four or five inches wide was picked from the wall, the value of which alone is way up in the hundreds. After that great care was used in breaking the rock, and tonight about 80 pounds of this remarkably rich ore had been found, and it was all brought to town and locked up in a safe. Its value is variously estimated at from \$3000 to \$6000. The camp is in a fever of excitement over the strike.

A LITTLE PROFIT STILL.—Idaho Springs News: For all that the price of silver is so low, many of the mines around Georgetown that produce galena, with a small per cent in silver, are being worked with profit, the bodies of ore that are uncovered being so immense. A vein of solid galena in the Seven-Thirty mine is 12 inches thick and is now exposed for a distance of 100 feet.

MONTANA.

THE GOLDEN SUNLIGHT.—Butte Inter-Mountain: It is rumored that the Golden Sunlight mines, recently sold for half a million dollars by the American Developing and Mining Company to a New York syndicate, are likely to change hands again for a million dollars.

From recent developments it is certain that half a million dollars was cheap for these properties. The ore is said to be unlimited in extent, and, judging from the extensive improvements being made, the company has every confidence in the permanence of the ore bodies. The mineral-bearing rock closely resembles that found in the Butte copper belt, and though the Camp Golden ore carries both silver and copper, its principal value is in gold. The vein now being worked is in a hill that looks very much like the Mountain View or Anaconda hills. The ore is being taken out through a tunnel near the top of the hill, and is raised through a shaft in the tunnel. At present operations are confined to the east side of the hill, though the employees live on the west side and have to cross over the top of the hill to their lodgings. On the west side there is a shaft and a new hoist. A boiler has recently been placed in position at this point to supply steam to operate the hoist.

A tramway 860 feet in length is now in successful operation at the mine. It is operated with two cars and is built at an angle of about 70 degrees. The ore bins at each end of the tramway are easily kept filled with ore. The force of miners employed is quite small as yet, but all that can be utilized are at work. At the present time there are 48 men on the payroll. Most of these are carpenters and builders, who are working like hammers.

Bunk houses for men, boarding houses and other necessary buildings are being constructed with all possible speed. Men are engaged in driving a tunnel which will tap the vein at a depth of 800 feet. This is now in 200 feet. Another gang of men is preparing a location for an air compressor. Stone masons are building a large-sized powder magazine. Laborers are employed on the wagon road from the mine to Clark's Spruce as the railway station has been named. Taken altogether, Camp Golden is the busiest mining camp in the State, and gives promise of a great future. It lies about three miles north of the railroad, and is reached by a circuitous and steep railway. As soon as accommodations are made the force of miners will be increased. Miners are camped all around the neighborhood awaiting orders to go to work.

The first ore shipment in bulk by the new company was made Friday, May 18th. The ore wagons hauled freight from the railroad spur and return with ore. Last week five carloads of the ore were shipped to Helena. The ore was second-class and is said to be worth \$1000 to the car. Ore shipments will continue regularly, the company now being in condition to make the mine pay for all the improvements being made.

The great drawback at the mines at present is the water supply. Water for domestic purposes is being hauled to the mine from Jefferson island at a cost of \$5 per day. The company has secured a spring in Soap gulch, 9000 feet from the mines, and it is proposed to pipe this.

Thomas Stairbird, formerly of the Granite Mountain mine, is in charge of operations at the mines. The company has plans perfected for a large concentrator, which will be located on the slough of the Jefferson river. This will be about half a mile from the railroad. An 80-horse power boiler is now being hauled up to the mines. The boiler has 50 flues and weighs 18,680 pounds. It required 12 horses to haul it. It will take several days to get this boiler to its destination.

Within 60 days, it is said, the company will have 300 men on the payroll. All miners who have seen the Golden Sunlight are unanimous in pronouncing it a great property.

NEW MEXICO.

GRANT COUNTY.—Enterprise: The big strike reported on the 625-foot level of the Graphic mine at Cook's Peak has proved of very great extent as far as developed, with the prospects and indications that it will open an enormous body of ore. After running a crosscut 115 feet from the shaft the vein was cut with a body of ore about four feet in width. Since then a drift has been driven along the vein, with an ore body from two to six feet in width the full length of the drift. The ore assays about 40 ounces in silver and 40 per cent lead. On the 500-foot level this same ore content was followed for 500 feet in length, and from present indications it will be fully as long on the 625-foot level. In the bottom of the drift the ore is fully as good, and indicates that other levels below can be opened with as good results.

Coast Industrial Notes.

—The season's seal catch has been the largest for many years.

—Men are reported working on Lassen county ranches for fifty cents a day.

—Fresno county is about to build a canal to tide water at an expense of \$150,000.

—It is proposed to light the New City Hall at a first cost of \$75,000, and \$15,000 annually thereafter.

—Fresno county is shipping wine to Liverpool via Cape Horn. The freight is about seven cents a gallon.

—Members of the Consumers Ice Company of this city say they can manufacture ice for \$2.50 per ton.

—The German Government this year has ordered 200,000 gallons of California brandy for use in hospitals, choosing it in preference to French.

—The extreme high water in the Columbia has greatly damaged the salmon fish interests, owing to the sweeping away of the fish wheels.

—The U. P. mortgage at Portland on the Oregon Railway and Navigation Company is about to be foreclosed because the bond interest has not been paid.

—From the slow way in which work is being done at the Union Depot at the foot of Market street, it is evident this century will not see its completion.

—The Senate has voted to put manufactured as well as rough lumber on the free list, which will be eminently acceptable to British Columbia lumber men.

—Several English fire insurance companies with San Francisco agencies will decline future American business, the alleged losses making necessary their withdrawal.

—J. J. Consins is about to build a new dry dock between North's ways and Hunter's Point. It will take a 2500-ton vessel. The Merchants' dry dock at the foot of Spear street is also to be rebuilt.

—W. B. Bonnin has sold his St. Helena winery to C. Carpy. It cost him \$600,000, and it is thought he got that for it. The cellar is the largest in America and has a capacity of 3,500,000 gallons.

—Wells, Fargo & Co. propose to prevent future train robberies so far as possible, and are having twenty-five cars fitted up for the run between here and El Paso, Texas, with chilled steel safes and other protection against burglars.

—The Northern Pacific Company is about to build new coal bunkers at Tacoma, nearly treble the size of any other bunkers in the Northwest, having a capacity of 15,000 tons, costing \$60,000, and enabling a 5000-ton cargo to be loaded in eight hours.

—The clearings at the clearing house in this city during May, '94, and May, '93, compare as follows:

	'93.	'94.
Clearings	\$69,718,702 93	\$60,131,580 42
Balances	8,664,515 51	7,603,282 77

—Representative Doolittle of Washington has introduced a bill to appropriate \$100,000 for ascertaining the subterranean water supplies in Idaho, Montana, Washington and Oregon, lying east of the Cascade mountains, and ascertaining the localities at which artesian wells can profitably be dug. It is proposed to have the work done by the Geological Survey.

—The Colfax Sentinel reports that water was turned into the new South Yuba canal last Wednesday, and for the first time in the history of the divide the residents will be able to secure water for irrigation purposes and to furnish power to run quartz mills. The South Yuba Company has spent several hundred thousand dollars in these improvements, and they intend to eventually furnish Sacramento with pure mountain water.

—S. J. Klein, a Roumanian, is conducting negotiations for the purchase of 200,000 acres of land belonging to the Mitchell estate in Merced county. If the deal is carried through, 14,000 Roumanians will settle in California as colonists. These Roumanians are of German descent and live in Bessarabia. They are dissatisfied with the arrangement whereby Bessarabia was ceded to Russia, and want to get away from Russian rule.

—Frank Johnson, of the Johnson-Locke Mercantile Co., would like to see California merchants and manufacturers reach after the South African trade, which is great and growing. He will dispatch the large iron steamer Santa Clara for Capetown direct about July 1st, provided 300 passengers are booked. There is good business to be secured with that section, now nearly altogether in English hands, and a direct line to the South African gold fields is in direct line with securing such business.

Patents Issued to Pacific Coast Inventors.

Reported by Dewey & Co., Pioneer Patent Solicitors for Pacific Coast, 220 Market St., S. F.

FOR THE WEEK ENDING MAY 29, 1894.

520,558.—CALIFRER—Adra F. Brockway, Pasadena, Cal.
520,538.—BUCKLE—C. A. O'Gier, S. F.
520,670.—WATER PUMP—Day & Hunter, S. F.
520,781.—CONE CLASPER—H. Fisher, Sacramento, Cal.
520,732.—PENCIL SHARPENER—H. Fisher, Sacramento, Cal.
520,563.—PROPELLER—O. B. Gentry, Vallejo, Cal.
520,689.—WRENCH—H. Krebe, San Pedro, Cal.
520,697.—ELEVATOR—W. H. McCoy, Los Angeles, Cal.
520,443.—CAR COUPLING—W. S. Miller, Spokane, Wash.
520,541.—ADVERTISING WAGON—J. N. Russell, Los Angeles, Cal.
520,663.—PEN FENDER—B. F. Smi b, Represa, Cal.
520,501.—CLOTHES DRIER—E. S. Sutton, Snohomish, Wash.
520,480.—KITCHEN CABINET—Minnie S. Thomas, Waterville, Wash.
520,549.—PRESERVING EGGS—F. M. Underwood, Pasadena, Cal.
520,719.—BLAST FURNACE—Walker & Murphy, Globe, A. T.
23,310.—DEIGN FOR SPOON—C. S. Thompson, San Diego, Cal.

NOTE.—Copies of U. S. and Foreign patents furnished by Dewey & Co. in the shortest time possible (by mail for telegraphic order). American and Foreign patents obtained, and general patent business for Pacific Coast inventors transacted with perfect security, at reasonable rates, and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

ENVELOPE.—George H. Martin, San Francisco, Cal. No. 519,864. Dated May 15, 1894. This invention relates to improvements in letter envelopes. The object is to provide an envelope for the enclosing of letters and papers; an improved method of cutting the paper so as to economize the stock from which the envelopes are cut; an improved method for overlapping and joining the end flaps upon opposite sides, so as to make a double thickness of material and make the envelope opaque, and a safety device for the envelope when sealed.

GUIDING DEVICE FOR DISCHARGE NOZZLES.—Charles F. Rodin, San Francisco, Cal., assignor of one-half to Adrian Merle and Andrew Rudegar, San Francisco, No. 520,222. Dated May 22, 1894. This invention relates to a device for guiding the stream from discharge nozzles to prevent a rotary motion thereof, and to maintain the body of water in a solid condition after it leaves the nozzle. The object is to provide a device which will correct the tendency of water to rotate and break into spray when it leaves a discharge nozzle under pressure. It is especially applicable to hydraulic nozzles of all descriptions which are used to wash banks of earth, and to the nozzles of fire engines, and in cases where it is desired to throw the solid stream of water to the greatest possible distance before it breaks. It consists essentially of interior prismatic tubes formed by rectilinear plates extending longitudinally through the pipe, to the end of which the discharge tip is connected, said plates being arranged to form enclosed triangular or rectangular spaces.

LEDGER INDEX.—Thomas A. Uren, Prineville, Oregon. No. 520,095. Dated May 22, 1894. The object of this invention is to provide a simple and convenient ledger index so that the accountant may, with convenience and a minimum loss of time, refer to any particular name and find the page of the index of the account required. It consists of a box or frame having a plain surface, a vertical series of slots in the front, a series of spring-actuated rollers within the box, strips or sheets of paper bearing references wound upon the rollers with the free ends projecting through the slots in the frame, crossbars secured to the free ends with indexed pull tags secured at or near the center. These bars have their ends projecting beyond the end walls of the slots to form limiting stops, and there are elastic cushions on each side against which the ends of the bars strike when they are drawn in by the action of the spring rollers. The frame or box has suitably formed irons at the bottom serving as feet, so that it may be attached to a desk or support. The names of the various customers or accounts, with the number of the page on which the account in the ledger is to be found, are written upon the sheets arranged alphabetically, and as many letters may be placed upon each page as the size and convenience of the apparatus will admit. It is only necessary for the accountant to pull out the broad sheet having the initial letter of the account he wishes, to find the name and page, and as soon as released the spring roller draws it inward and winds it up again.

PEN FENDER.—Brainard F. Smith, Represa, Cal. No. 520,663. Dated May 29, 1894. The object of this invention is to provide a means for protecting the edge of a ruler from the ink which is carried by the point of the pen when the latter is used for drawing lines, and to thus prevent the ink from being smeared upon the ruler and possibly transferred to the paper. It consists of a fender hinged at one end, adapted to be turned up into a vertical line by

the side of the penholder handle when not in use, or be turned down so as to stand opposite the point of the pen when it is to be used, and it is provided with a screw by which it is adjusted to and from the point of the pen at will.

Board Sales of Mining Stocks.

S. F. Stock Board.

THURSDAY, June 7, 1894.

9:30 A. M. SESSION.	
100 Alpha.....	12c 100.....57c
450 Alta.....	15c 500 G. & O.....56c
200 Andes.....	37c 100.....56c
50.....	48c 550 H. & N.....72c
100 Belcher.....	35c 200.....71c
650 Bodie.....	15c 300 Justice.....15c
200 Best & Belcher.....	1.55 500 Mexican.....1.00
300.....	1.50 350.....1.05
30.....	1.48 100 Ophir.....2.55
400 Eullion.....	2c 100 Overman.....12c
100 Bulwer.....	11c 400 Potomac.....52c
100 Caladenia.....	16c 700 Savage.....57c
50 Challenge.....	33c 500 Scorpion.....5c
100 Chollar.....	47c 300 Sierra Nevada.....80c
50 C. & V.....	3.50 50 Union.....57c
300.....	3.90 200 Utah.....57c
700.....	3.85 500 Yellow Jacket.....56c
20.....	3.50 600.....56c
300 Crown Point.....	65c
2:30 P. M. SESSION.	
100 Alpha.....	14c 100 Grand Prize.....5c
250 Alta.....	12c 500 H. & N.....75c
250 Andes.....	50c 100 Kentuck.....75c
150 Belcher.....	36c 200 Mexican.....1.05
150.....	58c 100 Mono.....28c
100 B. & B.....	1.50 250 Ophir.....2.35
400 Bodie.....	1.00 200 Overman.....21c
100 Bullion.....	21c 50 Potomac.....52c
400 Bulwer.....	12c 100 Savage.....57c
400 Chollar.....	41c 500.....70c
750 Con. Cal. & Va.....	4.15 300.....58c
1000 C. N. Y.....	3c 300 Sierra Nevada.....81c
500 Crown Point.....	73c 100.....52c
100 Exchequer.....	3c 350 Union.....68c
100 G. & O.....	35c 600 Yellow Jacket.....56c

Sampling Works for Sale.

The works are situated at Daggett, Cal., in the Calico Mining District, and on side track of the Atlantic & Pacific Railroad. They contain a first-class 50-horsepower Engine and 45-horsepower Boiler, with Ore-crusher and other machinery, Mill Scales, Assaying Outfit, etc., all nearly new. Also upon the premises an office building and a comfortable dwelling-house (portable). The above can be had at a bargain. Apply to JOHN H. GILLESPIE, 1914 Stockton St., San Francisco.

20-Stamp Mill for Sale.

In Southern California, a 20-stamp Gold Quartz Mill, with engine, boiler, self-feeders, rock-breaker, etc. As the premises are adjacent to Railroad, the Mill could be conveniently removed. Can be had at low price for cash. Address: "Quartz Mill," care MINING AND SCIENTIFIC PRESS, San Francisco.

Assessment Notices.

OCCEANICAL CON. MINING COMPANY.—LOCATION of principal place of business, San Francisco, California; location of works, Silver Star Mining District, Storey County, Nevada.

Notice is hereby given that at a meeting of the Board of Trustees, held on the thirty-first day of May, 1894, an assessment (No. 16) of Ten Cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the Secretary, at the office of the Company, Room 69, Nevada Block, No. 309 Montgomery Street, San Francisco, California. Any stock upon which this assessment shall remain unpaid on the 6th day of July, 1894, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the thirty-first day of July, 1894, to pay the delinquent assessment, together with the costs of advertising and expense of sale. By order of the Board of Trustees.

ALFRED K. DUBROW, Secretary.
Office—Room 69, Nevada Block, No. 309 Montgomery Street, San Francisco, California.

F. ORTON, Mechanical Engineer.

EXPERT DESIGNER of Special and General Machinery.
PREPARING PLANS of Steam, Air and Hydraulic Apparatus; Iron and Wood-Cutting Machines; Transmission of Power, Etc.

218 MISSION STREET, SAN FRANCISCO.

MINING AND SCIENTIFIC PRESS.

The Leading Mining Journal in America. Established 1860. Latest Discoveries in Science and Improvements in Mining and Mechanic Arts illustrated or described. A Standard Illustrated Weekly published at \$3 a year by DEWEY PUBLISHING CO., 220 Market St., San Francisco, Cal.

C. H. EVANS & CO.,

(Successors to THOMSON & EVANS.)

110 and 112 Beale Street, S. F.
MACHINE WORKS,
Steam Pumps Steam Engines
And All Kinds of MACHINERY.



FRANCIS SMITH & CO.,

MANUFACTURERS OF

SHEET IRON & STEEL PIPE

FOR TOWN WATER WORKS.

Hydraulic, Irrigation and Power Plants, Well Pipe, Etc., all sizes.

NO. 180 BEALE STREET, SAN FRANCISCO, CAL.

Iron cut, punched and formed, for making pipe on ground where required. All kinds of Tools supplied for making Pipe. Estimates given when required. Are prepared for coating all sizes of Pipes with a composition of Coal Tar and Asphaltum.

Market Reports.

The Markets.

SAN FRANCISCO, June 7, 1894.

The usual weekly fluctuations in silver left little difference between the opening and the close. The London press is practically unanimous in the assertion that England is expected to reopen the India mints or lose the cotton goods trade with China and Japan.

New York Prices.

NEW YORK, June 7.—Following are the closing prices for the week:

Silver in—				
London, N. Y.	Copper.	Lead.	Tin.	
Thursday.....	28 1/2	61 1/2	9 40	3 20 19 50
Friday.....	28 1/2	61 1/2	9 40	3 20 19 50
Saturday.....	28 1/2	62	9 40	3 20 19 50
Monday.....	28 1/2	62 1/2	9 40	3 20 19 50
Tuesday.....	28 1/2	62 1/2	9 40	3 20 19 50
Wednesday.....	28 1/2	62 1/2	9 40	3 20 19 50

The local bullion, money and exchange quotations current are as follows:

Commercial Loans, per cent per annum.....	7@8
Commercial Loans, prime.....	6@8
Call Loans, gilt-edged.....	7@8
Call Loans, mixed securities.....	7@8
Mortgages, prime, taxes paid by tender.....	7
New York Sight Draft.....	10c
New York Telegraphic Transfer.....	12 1/2 c
London Bankers', 60 days.....	\$4.88
London Merchants.....	\$4.86 1/2
London Sight Bankers'.....	\$4.86 1/2
Refined Silver, per ounce.....	62 1/2
Mexican Dollars, nominal.....	50 1/2 @ 51 1/2

DIVIDENDS FOR MAY.

The following local incorporations disbursed dividends during the past month:

Name.	Rate.	Amount.
Central Gaslight Co.....	\$1.00 per share.	\$20,000
California Electric Light.....	15c per share.	7,500
Edison L. and P. Co.....	8c per share.	10,666
Oakland Gas Co.....	20c per share.	6,000
Pac. Gas Improvem't Co.....	50c per share.	15,000
S. F. Gaslight Co.....	35c per share.	35,000
Contra Costa Water Co.....	50c per share.	15,000
Spring Valley Water Co.....	50c per share.	58,500
Atlantic Dynamite Co.....	40c per share.	12,000
California-Street Cable.....	50c per share.	5,000
Gary-Street Railroad Co.....	50c per share.	5,000
Metropolitan Railway Co.....	10c per share.	1,000
Alaska Packers' Ass'n.....	75c per share.	30,000
California Cotton Mills.....	\$1.00 per share.	6,000
Odd Fellows' Hall Ass'n.....	5c per share.	.....
Pac. Auxiliary Alarm.....	5c per share.	1,250
Pacific Telephone.....	40c per share.	13,200
Sunset Telephone.....	25c per share.	7,500
Copper Queen Con. M. Co.....	25c per share.	50,000
Golden Rule Mining Co.....	2c per share.	5,000
Highland Mining Co.....	20c per share.	10,000
Homestake Mining Co.....	15c per share.	18,750
Omaha Mining Co.....	50c per share.	12,000
Standard Con. Mining Co.....	10c per share.	10,000

Total.....\$354,366

A summary of the dividends for the month compares as follows:

	1893.	1894.
Gas companies.....	\$ 84,000	\$ 94,166
Water companies.....	70,000	73,500
Insurance companies.....	1,500	.....
Powder companies.....	19,500	12,000
Street railroad companies.....	10,000	11,000
Mining companies.....	176,100	105,750
Miscellaneous companies.....	24,200	57,950

Totals.....\$385,300 \$354,366

There was \$2,023,000 gold coined here in May; of that \$465,200 was paid in for duties and \$269,400 exported, leaving \$1,288,400 added to local circulation. During the five months from January 1 to May 31, the local gold coinage was \$9,760,000; there was paid in that time \$2,309,600, duties, and \$9,050,700 was exported, showing a loss to local circulation in that time of \$1,600,300.

During the same five months there was shipped from San Francisco specie as follows: Silver bars, \$2,311,905; Mexican dollars, \$1,750,552; S. American dollars, \$132,100; gold coin, \$9,050,700; silver coin, \$311,800; gold dust, \$200; currency and bonds, \$1,228,208; total, \$14,785,465. Of that amount \$10,147,107 was sent to New York, \$2,392,536 to Hong Kong, \$1,784,864 to Japan, \$329,008 to Central America, \$128,950 to Honolulu, and \$3000 to Samoa.

San Francisco Metal and Coal Market.

ANTIMONY.		QUICKSILVER.	
Per lb.....	@ 12	Home trade, pr. flask.....	35 50 @ 35 75
BORAX.		STEEL.	
Refined, in car lots.....	@ 7 1/2	English, D.....	@ 20
Powdered, do.....	@ 7 1/2	Onton tool.....	@ 34
Concentrated, do.....	@ 7 1/2	Silk Diam'd tool.....	@ 15
COPPER.		Pick & Hammer.....	@ 10
Bolt.....	23 @	Machine.....	4 @
Sheet.....	23 @	Too Oalk.....	@ 4
Ingot, jobbing.....	@ 20	PIG TIN.	
Do, wholesale.....	15 @	Spot @.....	21 @ 22
IRON.		Spot @.....	21 @ 22
Bar, hase.....	@ 24	Spot FROM YARD—PER TON.	Wellington.....\$8 00
Norway, hase.....	@ 4 1/2	Greta.....	7 50
PIG IRON.		Nansalmo.....	6 25
England.....	Spot.....	Gilman.....	5 75
Spot.....	23 @	Seattle.....	5 50
Am. Soft, No. 1.....	@ 23	Oose Bay.....	5 00
Shots No 1.....	23 @	Channel.....	8 75
Puget Sound.....	@ 23	Egg, hard.....	12 00
Olay Lane White.....	23 @	Walrus.....	7 00
Langdon.....	23 @	Scotch Split.....	7 75
Gartberrie.....	23 @	Brynho.....	7 25
Barrow.....	23 @	West Harley.....	7 25
Oargotest.....	@ 23	TO LEAD—PER TON.	
LEAD.		Australian.....	6 50 @
Pig.....	@ 23	Liverpool Steam.....	6 75 @
Bar.....	@ 23	Scotch Split.....	6 75 @
Sheet.....	@ 23	Cardiff.....	6 50 @
Pipe.....	@ 23	Lehigh Lump.....	9 75 @
SHOT.		Cumberland.....	9 00 @
Drop, sizes smaller than B.....	@ 23	Egg, hard.....	10 00 @
B, @ size of 25 lbs.....	@ 23	West Harley.....	9 25 @
Do do, Band larger sizes.....	@ 23	COKE.	
@ size of 25 lbs.....	2 10	English, to load.....	\$9 00 @ 9 50
Buck, Balls and Chilled.....	2 10	Do, spot, in bulk.....	@ 21 50
Do, @ size of 25 lbs.....	2 10	Do, in sacks.....	@ 21 50
Do, @ size of 25 lbs.....	2 10	Cumberland.....	9 00 @

Metallic Product of the U. S. for '93.

The following is from the Government compendium, just issued, of the mineral product of the U. S. for '93:

Product.	Quantity.	Value.
Pig iron, tons.....	7,124,502	\$84,810,426
Silver, Troy oz.....	63,000,000	77,575,757
Gold.....	1,739,081	35,950,000
Copper, pounds.....	337,416,848	32,054,601
Lead, tons.....	163,982	11,839,590
Zinc.....	78,832	6,366,500
Quicksilver, flasks.....	30,104	1,108,527
Aluminum, pounds.....	339,629	266,903
Antimony, tons.....	250	45,000
Nickel, pounds.....	49,399	22,197
Tin.....	8,938	1,788
Platinum, Troy oz.....	75	517

\$249,981,866

Mining Share Market.

SAN FRANCISCO, June 7, 1894.

Those who expected a steady appreciation in the price of stocks because they thought have been disappointed. Those who argue that the value of the mine has much to do with the current price of stock have also been disappointed. Low prices and little activity have characterized the week's business. Even the Virginia Enterprise says: "It is noticeable, however, that the more promising things look in the mines the more likely the price of stocks is to take a tumble."

The following illustrates the changes of the week:

MINES.	81	7
Utah.....	\$ 8 1/2	6
Sierra Nevada.....	1 00	81
Union.....	7 1/2	68
Mexican.....	1 35	1 05
Ophir.....	3 15	2 66
Consolidated California and Virginia.....	5 1/2	4 15
Best & Belcher.....	1 80	1 50
Gould & Curry.....	1 10	98
Savage.....	73	69
Hale & Norcross.....	60	75
Chollar.....	60	41
Potosi.....	1 00	55
Bullion.....	30	21
Eschquer.....	.....	3
Alpha.....	.....	14
Confidence.....	.....	58
Yellow Jacket.....	1 05	73
Crown Point.....	1 80	83
Belcher.....	25	21
Overman.....	20	15
Justice.....	.....	15
Alta Consolidated.....	.....	3
Consolidated New York.....	62	38
Challenge.....	1 40	1 00
Bodie.....	68	50
Andes.....	.....	50

The Standard Con. had \$34,064.86 on hand on the 1st.

The Crown Point Mining Co. at its annual meeting, at which 70,800 shares were represented, elected the following officers for the ensuing year: C. L. McCoy, president; A. K. P. Harmon, vice-president; James H. Dobinson, J. P. Martin and James Newlands, directors. James Newlands was re-elected secretary and H. M. Gorham superintendent.

There were 73,160 shares represented at the annual meeting of the Seg. Belcher & Midas Con. M. Co. Thos. Anderson, H. Zedig, J. P. Martin, J. H. Dobinson and W. H. Hart were elected directors. E. B. Holmes was re-elected secretary, W. E. Shiron was elected superintendent in place of H. M. Gorham.

The following is Supt. Lyman's letter regarding the last week's workings of the Con. Va., which so many have read and re-read in an effort to determine something satisfactory—or the reverse:

"1650 level—From the top floor of south drift 1 on the sill floor of this level in the ore body recently found, an upraise has been carried up 6 feet, and this opening has been extended out to the end, a distance of 6 feet, all in ore of high grade, with signs of lower-grade ore in the top. South drift 1 has been extended 9 feet, the first 5 feet in ore which will average 550 per ton. The length of this drift is 35 feet, of which 31 are in ore; the face is in quartz, with some porphyry, carrying a low assay value. At the mouth of this drift an upraise has been carried up and connected with the south end of south drift 2, in ore of good quality. South drift 1 on the 1700 level has been opened and repaired to a point 112 feet distant south from the winze.

The ore extracted during the week amounted to 67 carloads—about 66 tons, the average assay value of which, per car samples, was \$95.42 per ton; the largest portion of this ore came from south drift 3, and the remainder from the opening above south drift 1. 1000 level—the Rule drift—From the upraise on the east side of the main drift, 585 feet south from the shaft station, at a point 95 feet up, a northwest drift has been advanced 38 feet, and from this drift, at a point 20 feet in, a west crosscut has been advanced 15 feet; face in porphyry. The west crosscut from the main drift, 370 feet south from the shaft station, has been advanced 50 feet; total length 95 feet. At a point 235 feet south from the shaft station an east crosscut from the main drift has been advanced 23 feet; face in porphyry carrying lines of quartz.

There has been an increase of several men in the working force of the Crown Point and Con. Cal. & Va.

During May \$69,000 was paid on the Comstock for labor in the mines—about 156,000 more than for April.

Cal. Debris Commission Notices.

THE CALIFORNIA DEBRIS COMMISSION having received applications to mine by the hydraulic process from L. V. Tuff in the Concordia mine, near Oranburg, Plumas County, to deposit tailings behind dams in Cogswell Ravine and Jackson Creek; from the Northern Placer Mining Company in their mine near Oranburg, Plumas County, to deposit tailings behind dams in Little Long Valley Creek; and from Thomas White in the Schuyler mine, near Igo, Shasta County, to deposit tailings behind dams in Dry Creek, give notice that a meeting will be held at Room No. 52, Flood Building, San Francisco, Cal., on June 26th, 1894, at 1:30 P. M.

MINING SHAREHOLDERS' DIRECTORY.

COMPILED EVERY THURSDAY FROM ADVERTISEMENTS IN THE MINING AND SCIENTIFIC PRESS AND OTHER S. F. JOURNALS

COMPANY AND LOCATION.		No. AMT. LEVIED, DELINQ. AND SALE.		SECRETARY.	
A & M M Co, California.....	15.....	20.....	May 3, June 11, July 2.....	F M Husted, 530 California	June 20
Alta M Co, Nev.....	46.....	100.....	May 14, June 19, July 10.....	J E Jacobus, 309 Montgomery	June 18
Best & Belcher M Co, Nevada.....	66.....	250.....	April 30, June 5, June 25.....	L Osborn, 309 Montgomery	June 15
Bulwer Ouse M Co, Cal.....	9.....	100.....	May 24, June 24, July 27.....	O Osborn, 309 Montgomery	June 15
Cou New York M Co, Nev.....	9.....	100.....	May 17, June 21, July 3.....	C E Elliott, 113 Crocker Bldg	June 15
Cous St. Gothard M Co, Cal.....	9.....	60.....	May 17, June 21, July 3.....	F Halling, 309 Montgomery	June 15
Crown Point G & S M Co, Nev.....	01.....	250.....	April 23, May 28, June 18.....	Jas Newlands, Mills Building	June 14
Gray Eagle M Co, Cal.....	6.....	250.....	April 23, May 28, June 18.....	O D Bennett	June 14
Hale & Norcross M Co, Nevada.....	105.....	250.....	May 4, June 5, June 25.....	C O Harvey, 309 Montgomery	June 14
Heard M Co, California.....	2.....	250.....	April 23, June 1, June 18.....	A B Thompson, 309 Montgomery	June 14
Kubuck M Co, Cal.....	9.....	100.....	May 9, June 11, July 3.....	Aug Waterman, 309 Montgomery	June 14
Kendall Con M Co, Nevada.....	16.....	100.....	May 31, July 5, July 31.....	A K Durhrow, 69 Nevada Bldg	June 14
Occidental Con M Co, Nevada.....	12.....	250.....	May 4, June 6, June 26.....	J W Pew, 310 Fine	June 14
Ophir M Co, Nevada.....	10.....	200.....	May 2, June 11, July 9.....	E B Holmes, 309 Montgomery	June 14
Silver King M Co, Arizona.....	11.....	10.....	May 15, June 25, July 16.....	A Halsey, 328 Montgomery	June 14
S Eureka M Co, California.....	11.....	10.....	May 15, June 25, July 16.....	A Halsey, 328 Montgomery	June 14

For the South African Gold Fields!

THERE WILL BE DISPATCHED ABOUT JULY 1, 1894, Providing sufficient passengers offer, the superior, large and commodious iron steamer, SANTA CLARA, FOR CAPETOWN DIRECT.

Gold and Silver Miners and Mechanics preferred.

FIRST-CLASS PASSAGE TO CAPETOWN.....\$200
SECOND-CLASS PASSAGE TO CAPETOWN.....\$150

A large number having already engaged passage, early application to secure tickets is requisite. A competent Surgeon will be aboard. For information apply to

THE JOHNSON-LOCKE MER. CO.,
Passenger and Freight Agents, 204 Front St., San Francisco.
Or to WM. L. MERRY, Room 4, 204 Front St.

GOLD EXTRACTION EXTRAORDINARY!

Two Improved Crawford Mills have treated about one thousand tons ore at the Columbia Mine, Moore County, N. C., capacity of each mill being over 10 tons daily, and the cost of wear and tear 20 cents per ton. On a formal trial run of 100 tons, 84 per cent of ore's value was cleaned up in gold, exclusive of some rich concentrate produced by mill. Three additional Crawford Mills have been added to plant at this mine.

CHEAPEST AND BEST MILL IN THE MARKET.

MECHANICAL GOLD EXTRACTOR CO., 47 Broadway, New York.

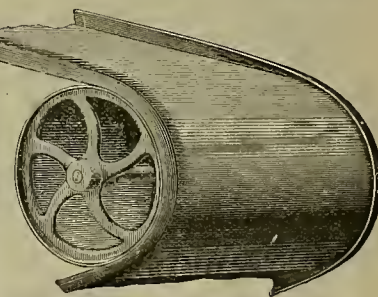
W. O. ROSS, Sec'y and Treas.

THE BLASDEL CONCENTRATING BELT COMPANY.

We are now having our new Improved Concentrating Belt manufactured in San Francisco. We keep always on hand Belts suitable for the Triumph and Frue machines, but can make any length or width desired. The advantages of these belts over any others will be readily seen by practical millmen.

First, the flanges or edges of our belt stand at an acute angle inclining toward the center, and therefore readily conform to the change of direction while passing over the end rollers; thus the vexation and loss caused by the frequent breaking of the flanges of the old style belt is practically done away with. Again, our belts, at intervals of two to four feet, have a very slight rifled face for the space of three inches, which tends to equalize the pulp on the belt, and prevents it from banking on the sides and forming channels through the center. These slight rifles also save very fine sulphurets and the quicksilver that would otherwise escape with the tailings from a belt, the surface of which is entirely smooth. We can safely say that it is a better concentrator belt than has ever been manufactured. It will last much longer and will handle more pulp. We also manufacture smooth belts with same flanges when desired.

H. G. BLASDEL, Jr., Manager, 419 California St., San Francisco.



P. & B. PAINT.

Absolutely Acid and Alkali Proof.

FOR CHLORINATION WORKS, and Preserving Wood and Iron from Acid Attack, Rust or Decay.

P. & B. ROOFING.

Send for Circulars.

PARAFFINE PAINT CO.,
116 BATTERY STREET, SAN FRANCISCO.

DOUBLE ACTING CORNISH PLUNGER.

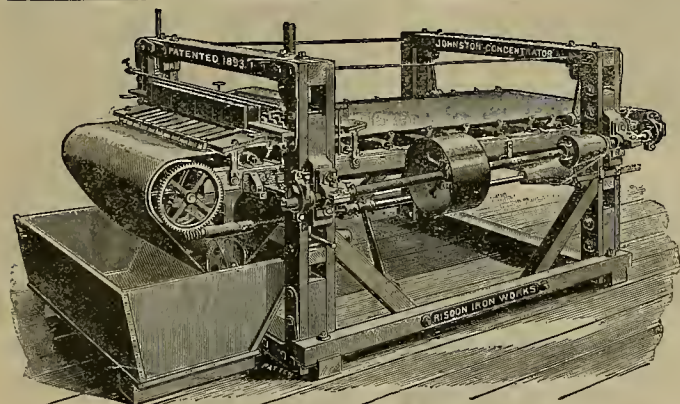
PUMPS TWICE AS MUCH WATER AS THE OLD PLUNGER. Only about one-third the weight of the old plunger. Special construction of steel for packing on mules, only one-twelfth the weight of the ordinary plunger. First outlay one-third less, works with 10 per cent less power.

IMPROVED SINKING PUMP.—Bucket and clack changed under water. Bucket lasts six times as long as the old one, saving expense of putting down another pump where bucket and clack cannot be changed under water. The self-tightening and self-lubricating stuffing box and new bucket also saves expense of dropping extra pumps.

WM. NANCE, Grass Valley, Nevada County, California.

The Johnston Concentrator.

SIMPLICITY OF CONSTRUCTION. GREAT DURABILITY. EASE OF OPERATION. INCREASED PERCENTAGE OF SULPHURETS SAVED.



THE JOHNSTON CONCENTRATOR.

(EXTRACT)
RISDON IRON WORKS.—The machine has the same monotonous record, i. e., they absolutely save all except traces of sulphurets. Ship Two more as soon as possible. Respectfully,
 (COPY)
THE RISDON IRON AND LOCOMOTIVE WORKS, San Francisco.
 GENTLEMEN: We have tested the Johnston Concentrator furnished us by you on trial; and after an exhaustive test, we are satisfied it is the best in the market. Please prepare and ship us—as soon as possible—THIRTEEN more machines.
 Yours truly,
 [Signed] **APOLLO CONS. MINING CO.**
 By **LEON SLOSS.**

MANUFACTURED BY
THE RISDON IRON WORKS,
 OFFICE AND WORKS:
Cor. BEALE and HOWARD STREETS, - - SAN FRANCISCO, CAL.
BUILDERS OF IMPROVED
 Mining, Milling, Pumping and Hoisting Plants.
 CATALOGUES AND PRICES FURNISHED UPON APPLICATION.

UNION IRON WORKS,

CORNER FIRST AND MISSION STS., SAN FRANCISCO, CAL.

MANUFACTURERS OF

MINING AND MILLING MACHINERY.

Automatic Cut-Off Engines, High-Speed Engines, Hoisting Engines, Quartz Mills,
 Manty Chili Mills, Rolls and Concentrating Machinery, Dodd Sigmoidal Water Wheel,
 PUMPS (Cornish and Other), Copper and Lead Furnaces, All Classes of Marine Work,
 SHIP BUILDERS, BUILDERS OF U. S. WAR SHIPS. HYDRAULIC LIFT DOCK.
NEW YORK OFFICE, 145 BROADWAY. Cable Address, "UNION."

FULTON ENGINEERING AND SHIP-BUILDING WORKS.

Successors to FULTON IRON WORKS (Hinckley, Splers & Hayes), and F. A. HUNTINGTON.
 OFFICE AND BRANCH WORKS: 213 FIRST STREET. - - - MAIN WORKS: HARBOR VIEW, SAN FRANCISCO, CAL.

MINING AND MILLING MACHINERY.

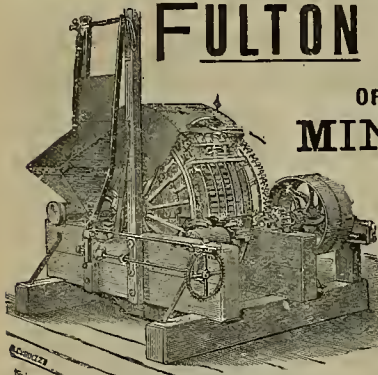
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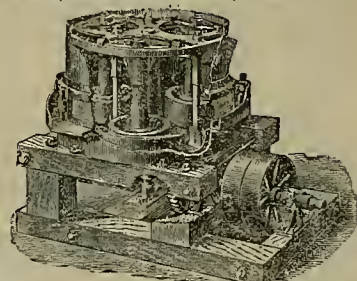
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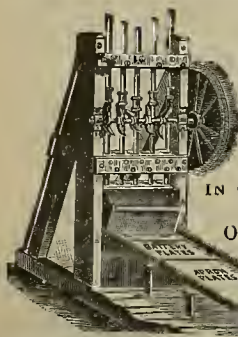
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MINING AND SCIENTIFIC PRESS.

AND PACIFIC ELECTRICAL REVIEW.

An Illustrated Journal of Mining, Mechanics and Popular Science.

VOLUME LXVIII.
Number 24.

SAN FRANCISCO, SATURDAY, JUNE 16, 1894.

Three Dollars per Annum.
SINGLE COPIES, 10 CENTS.

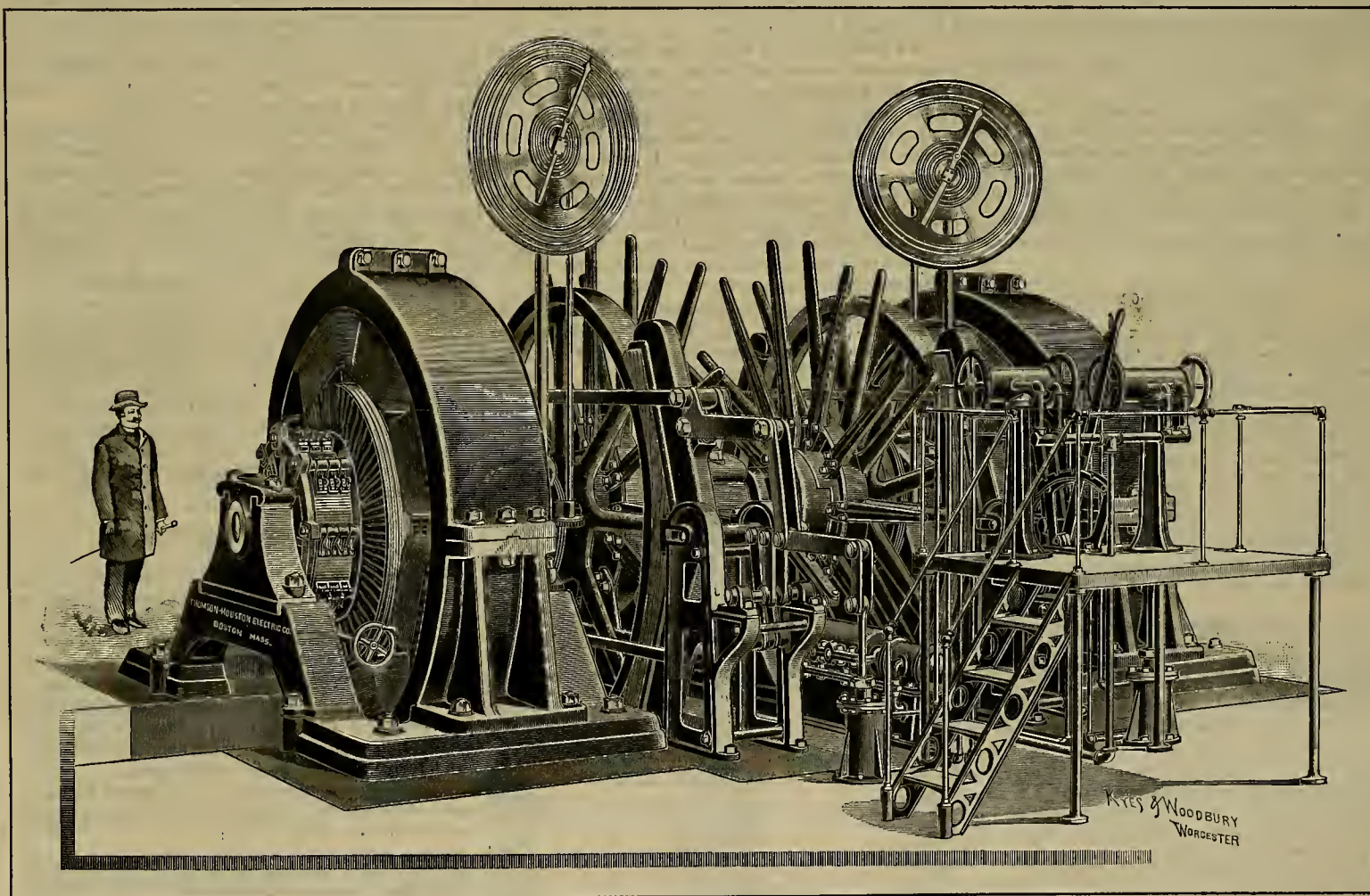
Direct-Acting Electric Hoists.

The rapid hoisting of heavy loads from deep mines by the direct application of the power to the reel shaft without the intervention of gearing, offers favorable conditions for the use of the electric motor in hoisting work. Economy can be shown in the use of power, while a high hoisting speed can be attained. Gearing has its limits, both in speed and safety. On this page is illustrated a direct-acting electric hoist using flat wire rope, operated

by jaw type, that portion of the shaft upon which they slide being hexagonal in form. Both clutches and brakes are operated by cylinders using compressed air. A small air compressor driven by an electric motor is placed at the center of the hoist, supplying air for this purpose. The compressor is automatic in its action, stopping when the pressure in the receiver forming its base reaches a certain point, and operates entirely independent of the hoist. Two sets of valves, actuated by hand wheels, one for brake and one for clutch, are placed convenient to the operator on

made and access had to all parts. They are mounted on heavy bed plates, also used for the two hearings at each end of reel shaft. A rheostat of ample capacity is provided for obtaining the slower speeds, resistance being thrown in or cut out by means of a controller and lever for operating. A reversing switch and lever for lowering is also provided.

THE Spokane Miner and Electrician thinks a thorough treatise on gold milling and silver milling is a present



1000 H. P. DIRECT-ACTING ELECTRIC MINING HOIST, FOR FLAT WIRE ROPE.

by two M. P. type motors, one on each end of the reel shaft, each capable of developing 500 H. P., or having a combined output of 1000 H. P. This hoist is designed to raise a load of 10,000 pounds from a depth of 2500 feet in one minute. Of course, for hoisting or lowering men, or for other purposes, any desired speed can be obtained at the will of the operator. Lowering can be done under complete control of the motors and without the use of the brakes when desired. Post brakes of a very powerful and effective type are used, being drawn together by rods above and below the reel shaft, so that all parts move in parallel lines, distributing the wear equally on the brake shoes and applying the pressure at two points in each shoe equally distant from the center. The shoes are also pivoted at the center, so as to quickly adjust themselves to the faces of the brake wheels. The clutches are of the

each side of the center of hoist, each set controlling the brake and clutch on its side. A powerful means of operating both clutches and brakes is thus provided, requiring practically no exertion on the part of the engineer.

The brake wheels, reels, etc., are, as will be seen, of the usual form, the brake wheel being keyed to the hub of reel, which runs loose upon the shaft when not in clutch. The reel hubs are hushed with hard composition, means for their thorough lubrication and easy removal being provided.

Dial indicators operated by worm gears on reel hubs are attached to each reel, showing position of cage in shaft. All levers are arranged within easy reach of the operator, so that one man can attend to both reels and brakes without difficulty. Particular attention has been given to the motors, so that all adjustments can be quickly and easily

necessary addition to technical literature. If a demand exist for such a work in addition to current publications on that subject, probably the most valuable would be a compilation of the articles that have appeared in the past two or three years in this and other publications giving attention to such work.

RECENT TESTS of the locomotive Columbia, with seven-foot driving wheels in the Baltimore & Ohio Railroad, show spurts of two miles a minute. The B. & O.'s best record is thirty-three miles in thirty-five minutes, not quite so speedy as the New York Central—forty-eight miles in fifty minutes.

THE financial disturbance in the Argentine Republic has resulted in sending gold to 308. At this figure a paper dollar there is worth 32.46 cents in gold.

MINING AND SCIENTIFIC PRESS.

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San Francisco, June 16, 1894.

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NEARLY five-sixths of the gold coined is in circulation; less than one-eighth of the standard dollars are in active circulation; about three-fourths of the smaller silver coin issue is in circulation. Recent treasury statistics show a falling off in the amount in circulation per capita. Estimating the population of the country at 63,275,000, the present per capita circulation would be \$24.54, a falling off of \$1.12 in four months.

Borax On This Coast.

This retention of the duty on borax is still an unsettled question. The borax deposits in this state and Nevada are valuable and their development depends largely upon congressional action. The industry represents about a million dollars a year. In '93 there were shipped over 7000 tons; the year before, 6500 tons. At present there are in operation about a dozen borax reduction works, at Lovelocks, Schmidt's, White Plains, Neuschander's, Columbus Marsh, State Line, Conn & Trudo's, Calm's, in Nevada; Daggett, Searles and Indian Wells, in California. The State Mining Bureau is in receipt of specimens from San Bernardino, indicating extensive and valuable borax deposits in that section.

To Be Practically Demonstrated.

The California Ground Electrical Company has incorporated to put the Emme Generator on the market. The inventor or originator of that process has for some time had his generator in operation to the entire satisfaction of himself and associates. The chief claim is that it is a constant electrical power with the minimum of expense, and without the use of the usual jars or boxes. The generator consists of forty-five plates, twenty-four of carbon and twenty-one of zinc, lying horizontally in three rows of fifteen each, with about one and one-half inches of space between them, all being connected by aluminum bands and bolts. The plates are each twelve inches square and five-eighths of an inch thick. On the generator dilute sulphuric and nitric acid is poured, with the alleged result of producing electric power far in excess of that of an ordinary cell battery of the same size, and at considerably less expense. Mr. Thos. Price, at whose works in this city the experiments have been made, calculates that during the ten days' trial there was consumed four and one-half pounds zinc, three and one-half pounds sulphuric acid, and twenty-two and one-half pounds nitric acid, developing an average of 2.23 amperes on motor, 25.86 amperes on short circuit, and 3.71 volts; the average fall of potential was .360; 98.73 watts were developed.

The inventor says the idea first occurred to him while engaged in metallurgical work in Georgia three years ago. He thinks that anyone possessed of sufficient electrical knowledge who will give the same amount of study to the subject that he has will arrive at the same conclusions.

"The Drain of Gold."

The movement of gold from this country to Europe is attracting universal attention. The reasons for it are as various as the reasoners themselves. But in stating a cause, what is new is not good and what is good is not new. It is one of the times when the wisest seem to be at fault. "All signs fall in a dry time," and the present is a very dry season. People who prophesied that the repeal of the "Sherman law" would stop the gold drain are as badly mistaken as those who thought the bond issue would mend the leak. When the Secretary of the Treasury declared that the drain was caused indirectly because of the purchase of silver bullion, Congress stopped such purchase; but the drain goes on, the noticeable thing about it being that all the remedies so far tried have proved ineffectual. In all the discussion, the logic of events is with the silver men; they have the best of the argument, for the declarations of the monometallists have all been negated by the inexorable facts.

On the first of this month the gold coin and gold bullion in the Bank of England amounted to over £36,000,000—the largest stock on record. Bullion went into the Bank of England during May as follows:

Date.	Amount.	Date.	Amount.
1.....	40,000 18.....	1.....	462,000
2.....	143,000 19.....	2.....	50,000
3.....	228,000 21.....	3.....	25,000
4.....	32,000 22.....	4.....	15,000
5.....	380,000 23.....	5.....	91,000
6.....	90,000 24.....	6.....	404,000
7.....	99,000 25.....	7.....	47,000
8.....	247,000 26.....	8.....	29,000
9.....	467,000 28.....	9.....	337,000
10.....	33,000 31.....	10.....	16,000
11.....	236,000.....		
12.....	140,000.....		
13.....	76,000.....		
14.....		Total.....	\$3,739,000

All this English plethora of gold does not come from the United States. In India, as elsewhere, the purchasing power of gold has appreciated, and the far East sends great sums in gold to London.

As a matter of fact, it would seem that the main reason for this great drain of gold is that its purchasing power since the demonetization of silver has so appreciated that it has become too valuable to hoard, and flows toward the financial center as the rivers flow toward the sea. It is within the limits of possibility that if gold continues to grow so plentiful in London, the English financiers, who are allowed by the supine policy of the United States to control the world, will seek to do with it what they have succeeded in doing with silver. It would be a gigantic sweep of the pendulum, but a not impossible one.

Returning to consideration of the present "drain of gold," it is interesting to observe the historic phase of the question. The following table is compiled from the most recent United States treasury reports. It represents the ebb and flow of gold to and from this country for twenty years; that is, ever since the demonetization of silver. It shows the excess of gold exports over gold imports, or of gold imports over gold exports, for each year:

Fiscal year ending June 30.	Gold movement—excess.	Fiscal year ending June 30.	Gold movement—excess.
1873.....	Ex. \$35,174,000	1884.....	Ex. \$18,929,000
1874.....	Ex. 14,840,000	1885.....	Im. 18,215,000
1875.....	Ex. 53,285,000	1886.....	Ex. 22,808,000
1876.....	Ex. 23,164,000	1887.....	Im. 33,209,000
1877.....	Ex. 344,000	1888.....	Im. 25,558,000
1878.....	Im. 4,125,000	1889.....	Ex. 49,697,000
1879.....	Im. 1,037,000	1890.....	Ex. 4,331,000
1880.....	Im. 77,119,000	1891.....	Ex. 67,139,000
1881.....	Im. 97,498,000	1892.....	Ex. 495,000
1882.....	Im. 1,798,000	1893.....	Ex. 87,508,000
1883.....	Im. 6,133,000		

The official estimate of the amount of gold in the United States on the 1st inst. is \$665,000,000, located in national banks as follows:

New York.....	\$35,707,000	Arizona.....	\$88,000
Illinois.....	26,000,000	Oklahoma.....	50,000
Pennsylvania.....	20,847,000	Montana.....	1,112,000
Massachusetts.....	11,650,000	Nebraska.....	2,123,000
California.....	7,700,000	South Carolina.....	103,000
Minnesota.....	4,116,000	North Dakota.....	229,000
Wisconsin.....	3,896,000	Connecticut.....	2,217,000
Indiana.....	3,800,000	New Hampshire.....	364,000
Missouri.....	3,340,000	Dist. of Columbia.....	1,230,000
Ohio.....	3,273,000	Indian Territory.....	38,000
Kansas.....	1,195,000	Iowa.....	2,110,000
South Dakota.....	298,000	Vermont.....	472,000
Arkansas.....	180,000	New Jersey.....	1,241,000
Oklahoma.....	184,000	Alabama.....	407,000
Nevada.....	52,000	Mississippi.....	77,000
Tennessee.....	789,000	Virginia.....	512,000
Maine.....	920,000	Maryland.....	2,430,000
Michigan.....	2,620,000	Washington.....	2,220,000
Florida.....	64,000	Colorado.....	2,096,000
Louisiana.....	463,000	Oregon.....	1,410,000
Kentucky.....	880,000	Rhode Island.....	710,000
Utah.....	555,000	Georgia.....	333,000
Wyoming.....	226,000	North Carolina.....	294,000
Texas.....	1,122,000	West Virginia.....	385,000
New Mexico.....	100,000	Delaware.....	162,000

Treasury officials figure that the June exports will aggregate \$10,000,000.

"COMPULSORY ARBITRATION" is the title of a leading editorial in a leading Eastern trade contemporary, endorsing that method of settling labor difficulties. The terms are, however, contradictory. There can be no such thing as "compulsory" arbitration. As well talk of "dry" water or "heavy" hydrogen. The moment any process of arranging any dispute, labor or otherwise, becomes "compulsory," it ceases to be arbitration.

The secretary of the London Stock Exchange says that the total amount of foreign bonds held in Great Britain is \$3,820,000,000. The interest on the American portion of this enormous holding is payable in gold, forming a factor in the present eastward drain of the yellow metal.

American Consular Reports.

Some years ago the United States consuls at their several posts were required to furnish data relative to the manners, customs, manufactures, exports, imports, and general business statistics. The duty became a permanent one; hence the State Department and later on the public press are constantly furnished with a vast amount of information, more or less valuable.

While much of this is good, there is, necessarily, a large percentage of doubtful value, for, however clever or deserving our consular service may be, its individual members must take much from hearsay. Information to be valuable must be accurate.

Mr. Benedict, U. S. Consul at Capetown, reports upon the gold yield of South Africa. He figures that the total for '94 will be 2,400,000 ounces. That is considerable, but bigger figures follow. Estimates are furnished of the "Rand" tract, showing that deep mining should, could or would produce a gold yield of \$1,710,596,000. These figures are applied to a small part—about one-fourth of the district. There are about a dozen districts, and the millions pile up, in Mr. Benedict's belief, till California is "not in it." While one's soul rejoices in the mere contemplation of such auriferous possibilities, still, examples of mining prophecies nearer home exemplify how widely such estimates may go of the truth. It is not given to every one to be a Philip Didesheimer.

Mr. Mason, U. S. Consul at Frankfurt, Germany, writes regarding a new process of making steel castings from iron or steel, by means of electricity, the castings to be warranted free from blowholes, which should be of interest to Messrs. Carnegie, Herbert, et al. The Tausig process is the name given to the method. The smelting and casting are done by electric heat influenced by rarefied air. The fused metal flows by gravity from the furnace to the moulds, and it is claimed that the work is successful, the electric current obviating the ordinary trouble arising from impurities where coal or other fuel is used.

The theory is a pretty one, and were heat alone required the facts might be made to fit. Heat being merely secondary, the entire metallurgical process of reduction from ore to iron or steel being a complicated one, it would appear that the whole thing is another case of where the facts run at right angles to private opinion. Then, again, it is figured by Mr. Mason that the cost of the electrical power is but trifling. But Mr. Monaghan, another United States Consul, at Chemnitz, Switzerland, makes another report, showing that the cost of production of electrical power in that class of country represented in Mr. Mason's conclusions is at least as much if not more than that of equivalent horse-power produced by steam.

While in these cases the standard of criticism must not be an exacting one, yet it would appear that in some of these reports the value to the reader lies largely in knowing what to reject, and in discounting many of the confident assertions.

To Relieve Mining Men.

The effort to induce Congress to re-enact the mining assessment law of '93, postponing the assessment work on mineral claims for the current year, ought to succeed. The claim made by those opposed to it, that it puts the miner in the attitude of a mendicant, is of no moment. It is a question of business, not sentiment. Of course, it isn't what would ordinarily be asked or expected, but in the present stress it is in order for a miner to ask an extension of time just as an embarrassed business man would wish a time of grace to meet his obligations.

The following is illustrative of the general feeling in regard to the matter. It is a report of a meeting held in Spokane, Wash., on the 1st inst.:

Another meeting of the mining men was held at L. K. Armstrong's room in Temple Court last evening, and after the minutes of the previous meeting had been read and adopted the committee on resolutions reported the following memorial, which was unanimously adopted:

To the Hon. Watson C. Squire at United States Senate Chambers at Washington, D. C., and to the Hon. John L. Wilson and W. H. Doolittle at the House of Representatives, Washington, D. C.: Your memorialists, citizens of the state of Washington, respectfully represent that we are largely interested in mines and mining properties; that we have contributed in a great degree to the development of said properties; that few of the properties we are interested in are upon a paying basis, and that their value is almost entirely a prospective one; that we have kept up the annual assessment on said properties hoping to interest capital to the full development of the same, and in view of the present depressed condition, financially, of the country we find it an impossibility to interest capital or to raise the necessary funds to do the assessment work; therefore, if the relief asked for is not given we will lose our investments and valuable property.

We, therefore, respectfully solicit that section No. 2324 of the revised statutes of the United States relating to mining claims be amended by suspending for the year 1894 the performance of \$100 worth of work as required by said section No. 2324, and that the provision of an act entitled "An act to amend section 2324 of the revised statutes of the United States relating to mining claims," approved November 3, 1893, be extended for a period of one year, so as to cover and embrace the year 1894.

Concentrates.

The Utica mine yielded \$225,000 in May.

PLACER COUNTY will have its day at the Midwinter Fair next Saturday.

WORK is to be resumed this week in the Grizzly Ridge mine, near Columbia Hill.

SAN FRANCISCO attorneys have attached the Suro tunnel for alleged legal services.

The Great Western Quicksilver Mining Co. is putting in new and improved machinery.

The new 40-stamp mill at the Madison mine runs like clock-work, says the Angels Echo.

The Red Roy mine on Clear creek, Baker county, Or., has sent a \$2500 cleanup into Baker.

The Rose Hill Gold Mining Co., is a recent Oakland, Cal., incorporation; capital stock, \$100,000.

The Hidden Treasure mine, Placer county, is about to incorporate with a \$350,000 capital stock.

The Buchanan Gold Mining Company of Tuolumne county has been assessed 12½ cents per share.

The Helvetia Mill and Mining Company has incorporated at Los Angeles, Cal., with \$100,000 capital.

With a capital stock named at \$12,000,000 the El Coronado Mining Co. has incorporated in this city.

The Morning Star Mining Company of Iowa Hill, Nevada Co., has declared a dividend of \$3 per share.

A ROASTER is being erected to refine the black quartz of the Little Anaconda mine at Wolf Creek, Oregon.

A 400-POUND nugget of solid copper is reported found in the bed of Rainy river, thirty miles from Sheboygan, Mich.

The Stanley Mining Company was incorporated in this city last Wednesday. Capital stock, \$100,000, all subscribed.

The Ward mine, at Whitlock, Mariposa county, will be operated by electric power furnished from the Merced river.

THIRTY men are now employed at the Gwin mine. The hoisting works will have a sinking capacity of 3000 feet.

The New Golden Rule Mining Co. is building a ten-stamp mill on the Middle Fork of the American river at Horseshoe Bar.

A GOLD STRIKE is reported from Dutch Tom Gulch, near Lander, Wyoming. Some of the dirt is reported as high as \$25 to the pan.

The Reno Borax Company has been organized to work the borax fields at Grant and Sulphur Springs, 100 miles north of Reno, Nev.

WHITE labor is not in demand at the British Guiana, South America, gold mines. The ruling rate of wages is fifty-four cents a day.

ONE HUNDRED men have been sent to Monte Cristo to begin work on the mines there, and the plant will go ahead full blast twenty-four hours a day.

GOLD DISCOVERIES are reported at Deer park, five miles north of Nevada City, made by T. P. Frances, who is said to have located several new ledges.

The Bradley Mill and Mining Company was incorporated in this city last Tuesday. Capital stock \$1,000,000, of which \$25,000 has been subscribed.

The United States manufactures more iron, steel, copper and lead than any other country on the globe, Great Britain being a little ahead on zinc and tin.

The owners of the Last Chance claim, Big Bend, have spent \$22,000 piercing 2200 feet of tunnel in all, and have not struck bedrock. Work will continue, however.

BOA INCAESOL believes in silver, but not in God, which inspires the reflection on the part of the Tombstone Epitaph that Bob has a Christian spirit, even if he is an infidel.

The "great gold find" reported on Box creek, Montana, turns out to be a fake. There was some fine gold found in the grass roots, but there is nothing to speak of below.

The quartz mill at Hiko, Nev., was entirely destroyed by accidental fire last week. The mill had been crushing ore from Ferguson district. The Eastern owners will rebuild.

IN THE business office of the MINING AND SCIENTIFIC PRESS this week a subscriber paid for his paper renewing from date of expiration to the close of the century—Dec. 31, 1900.

THE Great Vulture mine in Maricopa county, Arizona, which is credited with a production of \$15,000,000 in gold, is to be reopened. It is the property of ex-Senator Tabor of Denver.

FROM San Diego come reports that new placer diggings of considerable extent and richness have been found four miles from the camp of Juarez, below the boundary line, near Campo.

THE Tyler and Last Chance mines in the Coeur d'Alene have tired of litigation and contest for the same piece of ground and have consolidated in one company, to be worked as one mine.

SENATOR POWELL of Montana has gone a little beyond any previous effort in that direction, by introducing a bill suspending all annual assessment work for three years—'94, '95 and '96.

WILLIAM O'BRIEN writes to his Spokane friends that he has found diggings on the Clearwater, about seventy miles from Grangeville, which will yield from \$10 to \$15 per day with rockers.

THE current statement that "Cochiti, New Mexico, is a poor man's camp" causes the *Prospector* to enter the comment that this may be said with emphasis about all silver-mining camps just at present.

THE general manager of the Santa Fe railway system says that the traffic from the mines of New Mexico and Arizona brought more money to his road last year than the grain fields of Kansas and Oklahoma.

THE Nevada City Transcript learns that a French syndicate has been formed with a very large capital stock, and is now negotiating for the purchase of the Watt and other gravel mines in Bloomfield township.

ACCORDING to the Tombstone Epitaph, the Santa Fe railroad

company owns the biggest fire insurance policy ever written. It is for \$17,000,000 and covers every piece of combustible property that belongs to the company.

THE Bunker Hill and Sullivan mines, at Wardner, Idaho, have closed down, because the railroads are flooded and cannot handle the ore. Work is to be resumed as soon as the roads are ready for business.

MESSESS. HARVEY AND KITTO of Jackson, who won the first prize at the Midwinter Fair drilling contest, have accepted a challenge from two Angels Camp miners to drill against them for a prize of several hundred dollars.

THE first shipment of ore from the new development on the 1650 level of the Consolidated California & Virginia mine was made to the Morgan mill last Sunday. It included 160 tons of bulk assays, showing an average value of above \$90 per ton.

WALTER LASSWELL, employed in running the concentrators at the Rawhide mine, near Sonora, Tuolumne Co., for some months, has been arrested charged with stealing amalgam. Twenty-five pounds of amalgam were found in a tin can in his trunk.

A CANDLE-BOX of very rich specimen ore, literally filled with gold, has been brought to Nevada City, says the *Union*, from Kanaka creek in Sierra county. The find is regarded as a big strike. The name of the mine from which the rock came is the Tessler & Leon.

ACTIVE operations will shortly begin at the Centennial mine about fifteen miles from Nevada City. The ground incloses about one thousand acres, under which runs the old blue gravel lead. The main gravel channel has been developed by a 2600-foot tunnel, and rich results are expected.

AT LAST Wednesday's meeting of the Debris Commission a number of applications were received, but none were granted. Col. Benyard and Major Huer left last Thursday to inspect some hydraulic claims in Plumas county, the owners of which have made application to the Commission for permits to operate.

TWO Spokane men recently located 530 acres of placer ground in Grant county, Oregon, tests of which yielded fifty cents to the yard. They have made arrangements with Seattle men to spend \$50,000 in putting in a plant, and soon expect to have a dredge hauling from 1500 to 2000 cubic yards of gravel per day.

THE operators of the Cripple Creek mines cite that the wages they paid were as high as those paid at Leadville. The *Georgetown Courier* claims that the miners have to pay from two to three prices for everything they buy of Cripple Creek merchants. The cost of living there is said to be twice what it is in Leadville.

THE BUTTE *Inter-Mountain* says the most important happening of the week was the starting up of Anaconda's mammoth upper works smelter, which has been idle a long time. The Montana Ore Purchasing Company is adding improvements to its smelting and reduction plant that will cost, when completed, \$50,000.

DURING the past six months many new and valuable gold discoveries have been made in Nevada, and the *Enterprise* thinks that the opportunities for success in gold mining in Nevada are to-day far better than they are in South Africa. There the poor man has some show as well as the capitalist who enters the field with unbounded means.

THE *Union* reports that the Mountain Chief mine, at Willow Valley, has been bonded to Orlando Stoddard of Grass Valley by Messrs. Locklin, Dean and Ragon of Nevada City. A new two-compartment perpendicular shaft will be sunk to a depth of 100 feet, suitable machinery for the working of which is now being placed on the mine. It is a good prospect.

BY an agreement between the creditors and the owners, the Gover mine, near Amador, has been leased to a committee of five representing the former, in whose interest the mine will be run. The output of the mine under the lease is to be used to pay the labor employed by the new committee and the surplus to liquidate the claims of the holders of time checks, etc.

THE *Democratic Banner* of Sonora, Cal., says that a company composed of Chinese, with Chew Knn at the head, has taken charge of the Manzanito mine on the Stanislaus river, owned by Otto Kanig. A five-stamp mill has been purchased and is now on its way to the mine. This is believed to be the first company of Chinamen that has ventured into quartz mining in this State.

THE Shakespeare mill, near Forbestown, Butte county, which has been idle since January 1st, has started up again. Ever since the mill was shut down, development work has been carried on and the bins are full of ore and there is a good supply of rock in sight. At present, says the *New Era*, only ten stamps will be used, but the others can be started at any time, should it be found advisable to do so.

J. F. CLEMENT has sued Charles L. Hall in the Arizona District Court for possession of one-eighth of the Mammoth mine in Superstition district, forty miles east of Phoenix, and for \$25,000, estimated to be the share of net profits due on the one-eighth for the past year's operations. Clement is a mining expert on whose report Hall bought and alleges that the property is worth a quarter of a million.

RACANT mining companies incorporated at Denver, Col., are: The Great Western Gold Mining and Milling Company, capital stock \$700,000, Denver; Altrou Mining Company, capital stock \$200,000, principal office, Creede; Ramona Gold Mining and Milling Company, capital stock \$100,000, Denver; Duquesne Mining and Milling Company, capital stock \$1,000,000, principal office, Pitkin; Western Mining and Development Company, capital stock \$100,000, principal office, Jersey City, N. J.; principal Colorado office, Aspen.

HENRY HANSON, an old California miner, has been over at Westport, Wash., looking at General Don Carlos Buell's plant he has put up at Westport to extract gold from the sands of the ocean beach. He tells the *South Bend Journal* that when he arrived there General Buell was preparing to leave. The experiment has proved, it seems, a failure. Hanson panned out some of the sand. He found only a few colors, and they were small flakes as fine as gold leaf. Thus again have gold beach hopes vanished into thin air.

REPORT comes that the San Juan placers in southeastern Utah have been abandoned. Machinery was put in at a considerable

expense, but failed to extract the gold. There is gold in paying quantities in the placers, but it is almost as fine as flour and will have to be put through a process of amalgamation before it can be saved. The gold, unlike most placers, is in a cement formation that is almost impervious to water, and the ordinary methods of washing and sluicing will not dissolve the cement. These placers will have to be worked in a similar manner to gold-bearing rock, by mill process, before the fine gold can ever be successfully extracted from the cement.

A LETTER from the southern part of Lincoln county, Nevada, informs the *Record* that all the miners at the Keystone mine are under arrest for stealing ore. It is stated that for some time past the company suspected that small quantities of the richest ore were being systematically got away with. A detective was employed and put to work with those in the mine engaged in the stealing. The day shift would steal the ore and cache it, and the night shift would secret it under a mesquite bush. The work had been going on for some time, two wagon loads being shipped and preparations were under way for a third shipment when the matter was brought to light. An effort was made to place all the miners under arrest but three succeeded in escaping.

Clipped and Condensed.

GRANT, Sherman county, Oregon, has been destroyed by a flood.

A MILLION-DOLLAR FIRE swept the city of Panama last Wednesday.

A \$75,000 FIRE destroyed a part of Globe, Arizona, last Saturday.

THE Midwinter Fair Executive Committee announces the Exposition will close July 4th.

THIRTY THOUSAND MINERS on the island of Sicily are starving and hopeless of an improvement.

It is thought probable that the Pacific Railroad Funding bill will be defeated in the House Committee room.

THE Columbia and Fraser river floods are subsiding. The damage is estimated in millions, and loss of life is reported.

THE Dowell Observatory at Flagstaff claims to have discovered two star-like lights within the south polar snow cap of Mars.

UNLESS an envelope states the number of days a letter is to be held, the postmaster, by a new ruling, will hold it 30 days instead of ten.

STAKING coal miners in Ohio, Pennsylvania, Illinois and Alabama have inaugurated a dynamite campaign, destroying bridges and terrorizing wherever possible.

DESPITE Gov. Waite and other meddlesome politicians, the Cripple Creek, Col., mining troubles are almost ended. Arbitration has resulted in the miners carrying their point on the wages question.

THE deadly black plague is devastating the Chinese coast, 60,000 are reported to have died, half of Hongkong's population has fled, and fears are expressed that the disease will spread to other countries.

SUITS for \$15,000,000 each against the Crocker and Hopkins estates will shortly be instituted by the United States for the recovery of the debts owed by them to the Government as stockholders in the Central Pacific Railroad Company.

THE Illinois Supreme Court has decided that citizens of the United States cannot acquire title to real estate by inheritance when the inheritance has to be traced through alien ancestry, alleging that such alien ancestry is without inheritable blood, which is necessary to transmit an inheritance from one person to another.

THE House Committee on Commerce will shortly submit a favorable report on Senator Morgan's Nicaragua Canal bill, with some modifications. Seventy millions of stock is to go to the United States, \$1,500,000 to Costa Rica and \$6,000,000 to Nicaragua, as provided in the original bill. The Maritime Canal Company is to receive \$4,000,000 of stock as compensation for their expenses.

THE English combination of coal-mine owners has decided to make a general reduction of ten per cent in wages. The miners are organizing to resist the reduction. A cablegram from Edinburgh says that the Scotch Mine-Owners' Association has been officially notified that 7000 men would strike on June 24th if the association persisted in carrying out its intention of reducing wages one shilling a day.

LAST Tuesday, Senator Squire of Washington introduced a bill for the coinage of silver. It provides that the owner of silver bullion may deposit it at the Mint, receiving in payment standard silver dollars equal to the value of the bullion on the day of deposit, the difference to be retained by the Government as seigniorage and to be used as a reserve fund by the Secretary of the Treasury in maintaining the parity of silver dollars. The coinage of silver dollars shall not exceed \$4,000,000 each month. When the aggregate amount of money in the country reaches \$40 per capita, further silver coinage shall be discontinued and shall be resumed when it falls below that figure. Provision is made for coining silver half dollars of the present size and maintaining their parity in the same manner as other silver. They are also made legal tender.

Personal.

CONGRESSMAN CAMINETTI is visiting friends in Jackson, Amador Co.

E. B. PRATON, of the State Mining Bureau, is collecting data in Plumas Co.

SUPERINTENDANT L. L. MYERS has taken charge of the North Bloomfield mine.

GEO. MAINHART, of Grass Valley, is going to start up his Dublin Bay mine in a few days.

JOHN D. GOSSE, of Spokane, Wash., is to have charge of the German mine, near Washington, Nevada Co., which will shortly start up work again.

THOS. B. EVANS, a wealthy Colorado mine owner, has returned to Denver. During his recent visit here he bought a large placer plant, costing several thousand dollars, from The Risdon Iron and Locomotive Works. It is now being shipped to Mr. Everett's mine at Cripple Creek.

A Disastrous Rush from Coolgardie.

A prospector came in and reported having discovered payable gold 65 miles northwest of Coolgardie. It soon became known that Ernst (this was the prospector's name) had applied for a reward claim. The 80 ounces he had brought in were soon magnified into several hundred ounces, and the greatest excitement prevailed. Men could be seen pouring into Coolgardie from all directions, many groaning under their loads of tents, tools and worldly possessions, and all eager to get the first dray bound for the rush. Every vehicle and horse to be had was pressed into the service, and the storekeepers were rushed with diggers procuring supplies for the field.

Before nightfall fully three-quarters of the tents had disappeared, and their occupants were on their way to the rush. By some unaccountable blunder the teams all started out southwest instead of northwest.

They got to the Raeside soak, 35 miles from Coolgardie, all right, and were of opinion that they were within 30 miles of the find, instead of which they were farther off it than when they started from Coolgardie.

Their troubles then commenced. The country between the Raeside water and the rush is a sandy, waterless desert, trackless and destitute of landmarks to guide the traveler who might miss his way. Most of the teams, loaded with diggers' swags, tools and provisions, made the Raeside soak the first night, filled their tanks with water, and set off in a westerly direction, expecting to make the rush by night or early next day. Instead of making 20 or 30 miles, as they expected to do, they found the sand so deep and heavy that they could only do five to eight miles a day. They could only travel two or three days at this rate, and their water having run out, they would then throw off their load of swags, etc., and return to the water to fill up their tanks again. Some of the diggers would fill up their water bags and camp until the drays returned. Many of them, however, in their eager desire to reach the rush and be early on the field, started to walk. As they were all going west instead of east, they were always getting farther away from the rush, and as many of them, so soon as they thought they had traveled far enough to be on the field, struck out in a new direction, there were scores of men wandering about hopelessly lost, with empty water bags, on a sandy desert, with a fierce sun glaring on them all day. Walter Besant came into Coolgardie just a week after the rush was reported. He was delirious and wild from thirst, exhaustion and anxiety. But he was able to make known that a terrible disaster had happened. The authorities of the water supply acted with great promptness, dispatching camels loaded with water in a southwest direction to pick up and succor the lost ones, and sending horse wagons with tanks of water northwest to supply water to those who, having reached the field and found it a failure, would be returning by this, the right track, to Frost's rush or the 65-mile. What with camels in one direction and water carts in another, the water-supply people established a circle of water, saving the lives of some, and reducing the sufferings of many. Owing to the hardships and sufferings by the way of those who attempted Frost's rush, it acquired the name of Siberia, by which it is now known.

It is, however, believed that some of the lost ones never returned.—Australian Mining Standard, April 21st.

A Slightly Damaged Armor Plate.

Irving M. Scott of the Union Iron Works is authority for the statement that there is a slightly damaged armor plate on the United States coast defense vessel Monterey—one and no more. Further, he says, the Carogies knew about it, and the Government inspectors knew about it, and the latter accepted it with a full knowledge. He adds that the defect is not one that, in the opinion of the inspectors, affects its shotproof quality in any degree.

"The acceptance of the plate came about in this way," said Mr. Scott last evening. "The Monterey had been fully armored, save for one plate, and there was supposed to be need of her quick equipment because of the trouble with Chile. When this plate was inspected it was found that it carried on its end a slightly crystalline formation that was recognized as of slight importance, and it was decided to accept it, pending the casting of a new plate.

"The plate was sent out and put in place. Before work was begun on the new plate the Government decided, in consideration of a cut in the price, to accept the old one for the permanent armor, because, as stated, the defect was immaterial.

"All this talk about defective armor plates for the navy is simply nonsense," continued Mr. Scott, "and the greatest harm it does is in creating prejudice with the Senators and Congressmen from Inland States, who have little fear of foreign invasion and are quick to find reasons for refusing to vote appropriations for the navy. The fact is, as

Mr. Herbert himself says, the armor plates have been shown to be 5 per cent better than the specifications.

"There has been no secret about this defective plate, and the only reason I have not spoken of it before was that I was not asked."—San Francisco Call, June 9.

Simple Enough.

As a change from the story of Columbus and the egg, which may now very properly be laid aside until 1992 draws near, an incident related by a French man of science and vouched for by him may be told. This gentleman relates that he was at work before a glowing coal fire when some one tapped at the door, and a young girl belonging to a family who lived in a flat above him came in.

"Sir," she said, "would you kindly lend me a live coal or two to start our fire with? It's gone out."

"Certainly, my dear," said the savant. "But you have brought nothing to carry it in. Take my shovel."

"Oh, no, sir," answered the child. "I will carry the coals in my hands."

"In your hands? What do you mean? You'll be burned."

"Oh, no, sir. I'll show you how."

The child dipped up some ashes from the grate and placed them in the hollowed palm of her left hand. Then, with the tongs, she laid two burning coals on the top of the little heap of ashes. Then she bowed, smiled and went out, bearing her coals unharmed.

"Well, well!" said the man of science to himself. "Here I've been studying natural philosophy 40 years and never had the wit to do that!"—Youth's Companion.

Will Try It Again.

A party has been organized on the Klamath River to again institute a search for the wrecked Brother Jonathan. The history of the disastrous wreck and story of the immense treasure known to have been lost with the steamer are widely and familiarly known, and from the time of the sad event, some thirty years past, there have been repeated efforts made to locate the wreck and oftentimes its recovery reported. The company now having in contemplation its recovery will have its investigation probably based upon more reliable information than some previous efforts. The magnetic indicator with which they are provided is a new departure, the invention of Silas White, who was an original projector of the enterprise. The instrument consists of an arrangement similar to a surveyor's compass, the needle, however, being suspended so as to work perpendicularly, and to indicate the presence of iron. The immense amount of iron with which the vessel is known to have been freighted makes the project entirely feasible, as the needle is warranted to work satisfactorily to a depth of twenty or more fathoms. Some of the company are now stationed on the shore opposite the scene of the proposed researches.

That's the Way It Is, Sometimes.

In the history of prospects there is something peculiar. The first locators seldom, if ever, realize anything from the find, save hard knocks and privations. Lean streaks are encountered and the properties in many instances are abandoned, grass grows over the dumps, and the shafts or tunnels, as the case may be, come together. Years afterward other prospectors relocate the claim, go to work and find the mine just a few feet from where their predecessors left off working. Many an old weather-beaten prospector, who has toiled and borne the brunt of privation and at times of nearly starvation, has lived to realize that the claim he so patiently worked for months and perhaps years, and finally abandoned through discouragement and the pinching out of grub resources, is now panning out thousands upon thousands to the company to whom it was sold by the second locator. Philosophically, however, he chews the "cud" and keeps the heads of his drills well polished in quest of wealth in some other lead.—Silverton Gazette.

Corner in the Diamond Market.

Of the diamond market the *Jewelers' Circular* says: "Less than three months ago the entire stock of the company controlling the output of the world was sold to a London syndicate for \$6,250,000, the price per carat being in advance of that paid at a large sale just previous to that time. The stock of the company then advanced several per cent and the advance is still maintained. It is also untrue that shrewd buyers can now obtain small stones at a bargain in the European markets. The market was stripped of well-cut stones by the American buyers last year, and the tendency of prices is now upward, the fine goods being bought up by Europeans as rapidly as the cutters can turn them out. There is no immediate prospect of a decline from present prices."

Stagnation in Cariboo.

The following summing up of the outlook for Cariboo is contained in a private letter to the Kamloops *Sentinel*. The letter is dated Barkerville, April 20. It says: "At present the outlook is very blue. The place has grown from bad to worse ever since you left. As far as a man looking for work goes, it is almost out of the question, as no drifting claims of any account are at work now. The principal mining is hydraulic, and very little of that. There are more men here now than get employment, but rumor has it that we are to have a boom in the near future. A. D. Whittier has a lease of all the vacant ground on Williams creek, and the ground held as real estate he has bonded. He proposes to work the creek from top to bottom by a machine called an hydraulic jet. Slough creek is also held by a company of Americans. They are just about ready to try and sink their shaft. Law, late commissioner at the world's fair, has a scheme on foot to prospect Willow river below Mosquito creek. He is going to bore with some kind of an auger and has the old Lowhee engine on the ground. J. Allen and Frank Petries think they have found a continuation of the old Heron lead on Grouse creek. They ran a tunnel below where the pay streak was lost and sunk a blind shaft. They got six ounces out of the shaft. Quite a number of ten-mile leases have been applied for on Willow, Goat and Smoky, as well as on the Fraser. There are no new strikes. Hobson, at the forks of the Quesnelle, is going into hydraulic mining extensively, but he only pays about \$40 a month and board. George Isaac and Arthur Johnston and another man are on Stuart's creek prospecting. Arnold Wilson is working for Flynn on Mosquito creek. John Wilson is back on Lightning creek prospecting on the bench opposite the Costello. Barkerville is almost deserted; about twenty in the town now, all told."

They Own Gold Farms.

W. P. Russell has returned from a visit to his new placer property at Crane's flats in the Granite mining district, tributary to Baker City. He says he found the country much better than he expected, and states that the people of Baker City are now making arrangements to build a smelter and handle their ore at home.

"We have made a contract with a syndicate to put in machinery and work our property," said Mr. Russell. "They will put in a two and one-half mile flume, the whole dredge, steam pumps, elevated sluice boxes, etc., the whole plant costing from \$30,000 to \$50,000. They will begin building at once and expect to have the machinery at work within two months. It will run day and night, handle from 1000 to 3000 cubic yards per day. We have 580 acres of ground, yielding from 75 cents to \$1.50 in gold per cubic yard.

"This district has been worked constantly for thirty years, yet last year the banks at Baker City took in \$1,000,000 in gold dust and a great deal was shipped directly to the mints and assay offices. The country was first filled by old forty-niners from California, who realized that they had found a good field and stayed with it. Some of them are still there and have their children and grandchildren around them. Placer mining is regarded much as farming is in other places where the crop is sure. Everybody has money, too. But new capital is coming in now and the condition of the country is changing rapidly."—Spokane Chronicle.

Victory for Price.

Judge Morrow of the United States District Court awarded Thomas Price a judgment in the sum of \$70,000 against the owner of the British ship Elmbank, for saving the vessel and her cargo from destruction by fire. It will be remembered that the cargo of sulphur in the hold of the Elmbank became ignited while the vessel was at the dock in this port, and for several days efforts were made without success to extinguish the flames. Finally Professor Price was called upon for assistance. In about two days' time he succeeded in putting out the fire by the use of chemicals. The value of the vessel is \$76,000 and the cargo of sulphur was worth \$21,000.

Obituary.

Captain E. B. Zabriskie, the outgoing melter and refiner of the Carson mint, died suddenly of heart disease last Sunday.

Ex-Governor Rodman M. Price of New Jersey died at Oakland, N. J., on the 7th inst. He was a participant in the raising of the American flag by Commodore G. G. Sloat at Monterey, Cal., July 7, 1846, and a member of the constitutional convention at Monterey, Cal., in September, 1849; was formerly an officer in the United States navy, and when the American flag was raised in this region he was the first to exercise judicial functions under it as an alcalde.



THE UNION DEPOT.



THE W, ON THE ROAD FROM PIKE'S PEAK TO THE VALLEY.



SIGNAL STATION ON THE TOP OF PIKE'S PEAK.



A VIEW ON THE RIO GRANDE SOUTHERN IN EARLY SUMMER.



COUNTY COURT HOUSE, DENVER.

In and Around Denver, Col.

Second only to California in the beauty and extent of its scenery is the mountain State of Colorado, and second only to our own Pacific coast cities in much that makes manifest the march of progress is the pleasant city of Denver, where meet so many diverse elements, and where on every hand is such tangible evidence of wealth.

'Twas said of a famous wit and raconteur, that so great was his flow of animal spirits, so infectious was his immediate personality in promoting fun that one had to drink to keep sober in his company. Kindred exhilaration is experienced by the sojourner in Colorado's capital. The "Queen City of the Plains," with its 175,000 people, whether seen in the gold and gray of the morning, the full splendor of a cloudless noon, or the blue and silver of the night, is a splendid spectacle, an inspiring sight.

It has been our pleasure and our privilege to visit that pleasant city and other Colorado industrial centers more than once, and have found the people fully awake to their advantages, and determined to make all their past achievements but an index of what they propose to accomplish in the future.

Though sharing with the rest of the country in the present depression, the resources of Colorado are of so valuable and permanent a nature as to insure a quick return of the prosperity so manifestly due. Like our own great State, Colorado takes the precious metal from the ground, thus adding to the permanent, indestructible wealth of the world. The Centennial Commonwealth has thus augmented the general wealth hundreds of millions of dollars. Mining is the backbone of Colorado's prosperity, though it must be borne in mind that her manufactures represent over \$100,000,000 annually, and her fields and stock ranges \$100,000,000 more. We of California have so much scenery of superlative grandeur that even the superb landscapes and mountain views of Colorado fall to make much of an impression on a Californian, but we herewith present a few illustrations of Denver and vicinity, thus portraying the works of man rather than those of nature. Colorado's excellent system of railroads enables the visitor to quickly and easily see the principal points of interest in the State, and much that is worthy the chronicle of pen and pencil may be found in even the briefest passage through its limits.

The League of American Wheelmen will hold their mid-summer meet in Denver this year in the interest of good roads and kindred topics, and that city is now making preparations to receive and welcome its visitors. Acknowledgement is due Mr. Edward B. Light, secretary of the Denver Chamber of Commerce, and Mr. Sterling Elliott, editor of *Good Roads*, for courtesies extended, including the views that accompany this brief reference to one of the most attractive sections of the country.



CITY AND MOUNTAIN VIEW, LOOKING NORTH FROM CAPITOL HILL.



THE ALBANY HOTEL.



ON THE CARRIAGE ROAD FROM THE TOP OF PIKE'S PEAK.



A SCENE IN MANITOU SPRINGS.



DENVER HOSPITALITY.

The Mineral Hydrocarbons.

Their History, Geography, Geology, Physical and Chemical Properties and Uses.

NUMBER III.

Written for the MINING AND SCIENTIFIC PRESS and copyrighted 1894 by Henry G. Hanks, F. G. S.

Maltha is a Latin word derived from the Greek. The ancients made a distinction between petroleum and asphaltum; they sometimes confounded maltha, which partakes of the nature of both, with asphaltum, but their descriptions show that they were familiar with liquid bitumen or maltha.

Herodotus (Melpomene 195): "Near them, the Carthaginians say, lies an island called Cyraunis, 200 stades in length, inconsiderable in width, of easy access from the continent, and abounding in olive trees and vines. They add that in it is a lake from the mud of which the virgins of the country draw up gold dust by means of feathers daubed with pitch. Whether this is done I know not, but I write what is related; it may be so, however, for I have myself seen pitch drawn out of a lake and from water in Zacynthus, and there are several lakes there. The largest is 70 feet every way and two orgyæ in depth. Into this they let down a pole with a myrtle branch fastened to the end; it has the smell of asphalt, but is in other respects better than the pitch of Pieria. They pour it into a cistern dug near the lake, and when they have collected a sufficient quantity they pour it off from the cistern into jars."

Strabo (Book 16, chap. II-XLIV): "Near Moasada are to be seen rugged rocks, bearing marks of fire, fissured in many places, a soil like ashes, pitch falling in drops from the rocks."

Vitruvius (Architecture, Book 1, chap. V): "I do not think it requisite to dilate on the materials whereof the wall should be composed, because those which are most desirable cannot, from the situation of the place, be always procured. We must therefore use what are found on the spot, such as square stones, flint rubble stones, burned and unburned bricks; for every place is not provided, as is Babylon, with such a substitute for lime and sand as burned brick and liquid bitumen."

Pliny (Book 2, chap. CVIII): "In Samosata, a city of Commagene, there is a pool which discharges an inflammable mud called 'maltha.' It adheres to every solid body which it touches, and, moreover, when touched it follows you if you attempt to escape from it. By means of it the people defended their wall against Lucullus, and the soldiers were burned in their armor. It is even set on fire by water. We learn by experience that it can be extinguished only by earth."

Ovid, in his story of Byblis, refers to maltha as he knew it. "Immediately, as drops from the cut bark of the pine tree, or as the viscid bitumen flows from the impregnated ground, or as water, * * * etc." (Met. 9-658.)

The ancients were aware of the nature of petroleum and to a limited extent made use of it, but they never explored for it by sinking deep wells as the moderns do. A number of ancient writers refer to it in their works.

Strabo in his geography (Book 5, chap. IV) 8 states the following: "The land about Vesuvius contains fat and a soil which has been subjected to fire, and is very strong and productive of fruit. When this fat superabounds it is apt, like all sulphurous substances, to take fire; but, being dried up by evaporation and pulverized, it becomes a productive earth."

Vitruvius (Architecture, Book 8, chap. III): "In many other places the springs, rivers and lakes which are near salt pits are therefrom rendered salt; others running over veins of fat earth issue forth impregnated with oil, as at Solæ, a city of Cilicia, a river called Liparis, in which those that wash or swim are, as it were, anointed by the water. In Ethiopia there is a lake which anoints those that swim therein. In India there is another which, when the sky is clear, emits a great quantity of oil."

Pliny (Natural History, Book 35, chap. LI): "There is also found an unctuous liquid bitumen resembling oil in a spring at Agrigentum, in Sicily, the waters of which are tainted by it. The inhabitants of the spot collect it on panicles of reeds, to which it very readily adheres, and make use of it for burning in lamps as a substitute for oil, and also for the cure of itch-scab in beasts of burden." Quoting from Polycritus, the same author continues (book 31, Chap. XIV): "The water of the river Liparis, near Soli, in Cilicia, is used as a substitute for oil."

Diodorus Siculus (Supplement to Book 17-5): "At the time he was encamped near the river Oxus, two springs rose out of the earth near Alexander's pavilion, the one of water and the other of oil, of which prodigy Ptolemy Lagus forthwith informed the king as soon as he heard of it, whereupon Alexander, without delay, at the command of the priest, sacrificed. Aristander, the priest, told the king

that the fountain of oil portended labor, but victory at last—the fruit of toil and pain."

This locality is not very distant from Baku, the seat of the present great Russian oil fields, but lies to the east of the Caspian sea.

Plutarch, in his life of Alexander, gives the following version of the same story: "A wonderful thing happened not long after and was thought to presage better for Proxenus, a Macedonian, who was chief of those who looked to the king's furniture. As he was breaking up the ground near the river Oxus, to set up the royal pavilion, he discovered a spring of a fat, oily liquor which, after the top was taken off, ran pure, clear oil, without any difference either of taste or smell, having the same smoothness and brightness, and that, too, in a country where no olives grow. * * * The diviners told him that it signified his expedition would be glorious in the event, but very painful and attended with difficulties, for oil, they said, was bestowed on man by God as a refreshment of his labor."

Marco Polo (Book 1, chap. IV) refers to the Assyrian locality as follows: "Bordering upon Armenia to the southwest are the districts of Mosul and Mardin, which shall be described hereafter, and many others too numerous to particularize. To the north lies Zorania, near the confines of which there is a fountain of oil that discharges so great a quantity as to furnish loading for many camels. The use of it is not for the purpose of food, but as an unguent for the cure of cutaneous distempers in men and cattle, as well as other complaints. It is also good for burning; in the neighboring country no other is used in their lamps, and people come from distant parts to procure it."

This in all probability refers to the Baku oil districts on the shores of the Caspian sea.

John Cartwright mentions the same locality in his travels: "Near to this place is a very strange and wonderful fountain underground, out of which there springeth and issueth a marvelous quantity of black oil, which serveth all the parts of Persia, to burn in their houses, and they usually carry it all over the country upon kine and asses, whereof you shall oftentimes meet there three or four hundred in company."

John Gadbury (The Nature of Prodiges; London, 1660), has written the following (fol. 55): "In A. D. 323 a fountain ran with oil in Italy." In the same curious book may be found the following (fol. 9): "It is also prodigious for wool and oyl to be poured down from the skye on the earth, as at Velos, a city of Hetruria, in Anno mundi 3842, it rain'd oyl extremely;" and fol. 64, "A. D. 746, oyl rain'd in Spain."

Naphtha is a Latin word derived from the Greek; it was also called *oleum incendiarium* and *oleum vitum*.

The ancients were familiar with localities and the nature of naphtha, but we have, I believe, no record of their having made use of it, as the mediævals certainly did. The following quotations embrace all of interest I have been able to gather:

According to Strabo (Book 16, chap. I-XV) "asphaltus is found in great abundance in Babylonia." He quotes Eratosthenes as follows: "The liquid asphaltus, which is called naphtha, is found in Susiana. * * * The liquid kind called naphtha is of a singular nature; when brought near the fire the fire catches it, and if a body smeared over with it is brought near the fire it burns with a flame which it is impossible to extinguish except with a large quantity of water; with a small quantity it burns more violently, but it may be smothered and extinguished by mud. * * * Poseidonius says there are springs of naphtha in Babylonia, some of which produce white and others black naphtha. The first of these, I mean the white naphtha which attracts flame, is liquid sulphur; the second or black naphtha is liquid asphalt and is burned in lamps instead of oil."

Pliny (Natural History, Book 2, chap. CIX): "Naphtha is a substance of a nature similar to maltha. It is so called about Babylon and in the territory of Astaceni in Parthia, flowing like liquid bitumen. It has a great affinity for fire, which instantly darts on it whenever it is seen. It is said that in this way it was that Medea burned Jason's mistress, her crown having taken fire as she approached the altar for the purpose of sacrificing."

Book 35, chap. LI: "Some authorities include among the bitumens, naphtha—a substance we have already mentioned in the second book—but the burning properties which it possesses and its susceptibility of igniting render it quite unfit for use."

The following is from Plutarch's life as Alexander: "From hence he marched through the provinces of Babylon, which immediately submitted to him, and in Ecbatana was much surprised at the sight of the place where fire issues in a continuous stream, like a spring of water out of a cleft in the earth, and the stream of naphtha which is not far from this spot flows out so abundantly as to form a sort of lake. This naphtha in other respects re-

sembles bitumen; is so subject to take fire that before it touches the flame it will kindle at the very light that surrounds it, and often inflame the intermediate air also. The barbarians, to show the power and nature, sprinkled the street that led to the king's lodging with little drops of it, and when it was almost night stood at the end with torches, which, being applied at the farther end of the moistened places, the first taking fire, instantly, as quick as a man can think, it caught fire from one end to the other in such a manner that the whole street was one continued flame.

"Among those who used to wait on the king and find occasion to amuse him when he anointed and washed himself, there was one Athenophanes, an Athenian, who desired to make an experiment of the naphtha upon Stephanus, who stood in the bathing place—a young man with a ridiculously ugly face, whose talent was slinging well—"for," said he, "if it take hold of him and is not put out, it must undeniably be allowed to be of the most invincible strength." The youth, as it happened, readily consented to undergo the trial, and as soon as he was anointed and rubbed with it his whole body broke out into such a flame and was so seized by the fire that Alexander, in the greatest perplexity and alarm for him, and not without reason, for nothing could have prevented his being consumed by it, if by good chance there had not been people at hand with a great many vessels of water for the service of the bath, with all of which they had much to do to extinguish the fire, and his body was so burned all over that he was not cured of it for a good while; and thus it is not without some plausibility that they endeavor to reconcile the fable to the truth who say this was the drug in the tragedies with which Medea anointed the crown and veil which she gave to Creon's daughter, for neither the things themselves nor the fire could kindle by its own accord, but, being prepared for it by the naphtha, they imperceptibly attracted and caught a flame which happened to be brought near them."

Creusa, sometimes called Glauce, according to the myth, was about to marry Jason. Medea prepared a garment, said to have been poisoned, but believed by others to have been saturated with naphtha, which Creusa had no sooner put on than it burst into flames and caused her death.

The version by Diodorus Siculus of this myth is as follows (Book 4, chap. IV): "Medæa therefore being commanded to leave the city, having only one day allowed her by Creon to prepare for her departure, by the art of witchcraft she changed the form of her countenance and entered the palace in the night, and by a root, found out by her sister Cerces (which, being kindled, could not be extinguished), she set fire to the palace; now, all being in a flame, Jason sprang from the burning and so escaped, but Glance and her father Creon, hemmed in on every side by the fire, were both consumed."

(To be continued.)

Nitrate Beds in Colombia.

Immense nitrate of soda deposits have been discovered recently in the United States of Colombia, South America. As these beds are situated on or near navigable rivers, which run into the Caribbean sea, they are thus over 2500 miles nearer the markets of the United States and of Europe than the Chili fields of niter.

The new nitrate beds are about 30 square miles in extent, and are from one to ten feet in thickness. They lie at Val du Tar, south of the spurs of the Sierra Nevada de Santa Marta, a distance of 65 miles from the city of San Juan de la Ciénaga, and are in part on the waters of the San Sebastian river, which flows into the great sea level lake of Ciénaga Grande, which is in the extreme northern portion of the Republic. These nitrate fields can be placed upon a direct line of inland navigation by connecting the waters of the Aracataca river with those of the San Sebastian, at a cost not exceeding \$5000. When the Santa Marta seaport railway is finished, it will run to the village of Fundacion, and within half a mile of the nitrate beds.

These deposits lie at a depth of from 8 to 20 feet below the surface and rest on a stratum of carboniferous sandstone. The caliche or saliterras itself contains, besides the niter, calcium sulphate, calcium carbonate, iron oxide, salt and magnesite. The deposit appears to be of recent date, and it is evident that the nitrate has been produced by the chemical reactions of vegetable substances and lime in its various forms.

These deposits promise a supply of over seven billion tons of caliche, assaying 11½ per cent of saltpeter on an average to the ton of raw material; 100 parts of the caliche contains eleven parts of niter and two parts of phosphate. The calcium phosphate is fossil bone, and assays 55 pounds to the ton of caliche. It will cost from \$8 to \$11 per ton to separate the pure nitrate from caliche and deliver it in New York City.

Folsom's Former Gold Yield.

"E. C. R." in the Sacramento Bee.

As near as can be ascertained, the first mining of any consequence done in the vicinity of Folsom was in the year 1854, when gold in large quantities was discovered on what was designated Nigger Bar, situated about half a mile from the present location of the town. Within a short period of the discovery over one thousand men were working on the bar, and it is safe to say that the output was at least a half an ounce per day to the man. At that time all the mining was done on the river bars, and it was not long before the diggings on Beals, Condemned, Rattlesnake, Bean, Mississippi, Sallor and numerous other bars along the American river were discovered and populated by crowds of eager miners delving for the golden sands.

As the bars became exhausted prospects were made in the surrounding country, and the mining districts of Rebel Hill, Prairie City, Nigger Hill, Rhodes, Willow Spring and Walltown were found to be enormously rich. It would be simply impossible to accurately ascertain the amount of gold produced within the last 40 years from this large out-

month, after paying all expenses, found himself \$4000 in pocket. About a week later portions of his mine caved in, caused by insufficient timbering, and he expended the majority of the money before extracted in retimbering and clearing out the debris. Shortly afterward the Chinese declared that the pay streak had "pinched out," and he eventually sold his interest to another company of Chinese for the sum of \$300. Within a month this company and the Chinese who had been in his employ cleaned up over \$76,000, and selling out, returned to China. Then it was discovered that his former employes had simply drifted over the gold, leaving it on the bedrock, and, through emissaries, had purchased all the right and title, and, to use a popular expression, "scooped the whole cheese."

Next to Beale's Bar, which is conceded to have been the richest deposit along the American river, Buckeye Bar was probably the next on the list. It gave an output of \$700,000 the first season, and during the first five years it was mined the books of the company owning it showed a production of \$3,000,000.

Main Bar is reputed to be enormously rich; but, owing to the depth of the debris deposit, and the narrow confines

sinking a shaft near Mormon Island and in close proximity to the river when he was approached by a tenderfoot who asked if he could inform him where he could dig a hole and get some gold.

"Yes," was the answer, "dig right over there," tossing a small stone to designate the spot, and so close to the river as to lead the experienced miner to suppose that the tenderfoot would be flooded out after he had dug a few feet; but, on the contrary, the tenderfoot, at the depth of 20 feet, struck a pot-hole and panned out \$10,000, while the old miner did not extract gold enough from his shaft to pay for his grub stake.

The majority of the gold that has been produced in the environs of Folsom during the mining period has been washed from the earth, and but little attention has been paid to the different quartz veins that seam the country in all directions, except by pocket hunters, many of whom have been and are extracting considerable sums at times, and yet in the Rhodes digging district, and throughout Walltown, there are numerous holes of gold-bearing rock that only await capital and enterprise to yield in paying quantities.

Of the present producing mines, perhaps that owned and operated by Messrs. White and Donnelly is giving the largest returns. These gentlemen employ about 20 men and wash up on an average once a week. Some Chinese in the same locality have a very rich mine, but decline to allow any investigation to determine the amount derived.

The mine operated by Jackson and McCue, although at great expense, on account of the large quantities of water encountered, is paying well. Nearly all the old localities have some good claims left which turn out yearly a regular sum; and, although it is a thing of the past for one to take a pan or a rocker and make an ounce a day, yet the environs of Folsom will yet demonstrate that not all the gold was extracted in the days gone by, and that with the expenditure of but little capital the lower strata, which have never been reached, will yield a rich return.

Combined Punch and Shears.

On this page is illustrated a combined punch and shears, designed for general work in either boiler or structural shops by the Hilles & Jones Company, Wilmington, Del. One end of the machine is fitted with knives for trimming plates. This end can also be arranged with knives and blanks for cutting off round or flat bars, or with a punching arrangement, as may be desired. The other side of the machine is arranged with a cast steel overhauling die block used for punching channels, I beams, angles, flanges, etc. There is a filling piece which can be used under the overhauling die block when preferred, when channels and I beams are not being worked. Both ends of the machine are independent of each other, both being controlled by clutches faced with steel. The depth of throat of the machine shown in the cut is 30 inches on each side. The weight is about 33,000 pounds. The proportions of gearing, arrangement of the metal to take the strains and all other points of detail have been carefully worked out. The sliding head is counterbalanced through a tension spring and has a taper brass shoe for taking up the wear.

Coal Consumption of the Columbia.

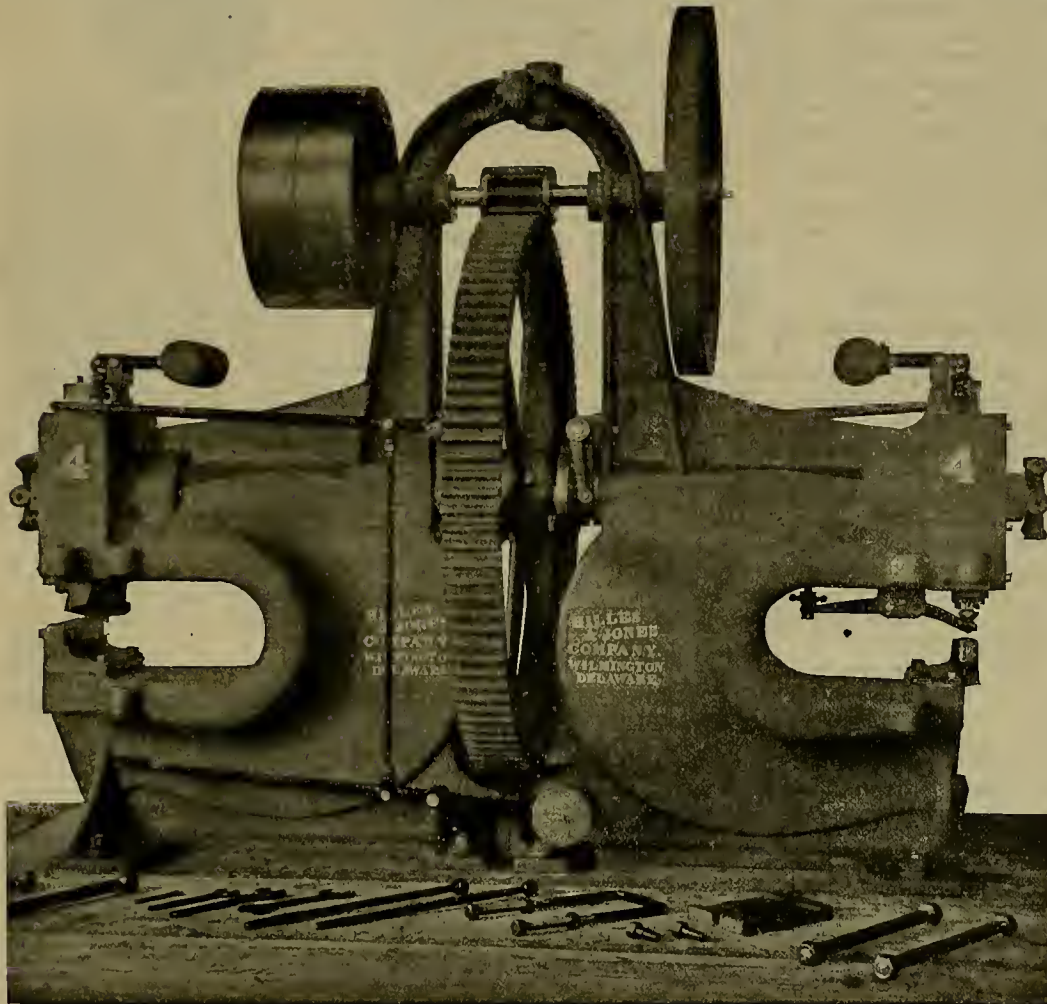
The official report of the inspection at sea of the cruiser Columbia shows that she is incomparably the most economical naval vessel in the world.

Four trials of six hours each were conducted. In the first, with three engines, she ran at the rate of 16.41 knots, with a coal consumption of 125.6 tons per day. Two machinists and six men then disconnected the twin wing screws in 40 minutes, and then followed a six hours' run, using only the single central screw, developing a speed of 10.06 knots, and consuming coal at the rate of 38.3 tons per day. The third trial was with all three engines, during which the remarkable speed of 18.4 knots was maintained for six hours, the coal consumption rising to 223 tons daily.

Then one machinist and three men disconnected the central screw, and on the two remaining engines, with 70.2 tons daily coal consumption, a speed of 13.56 knots was recorded.

The great efficiency of the ship is apparent when it is considered that the coal bunker capacity of the ship is 2450 tons, which, with the central screw for ordinary cruising purposes, gives the vessel a steaming radius of nearly 12,000 miles, unequaled by any vessel afloat.

THE most widely separated points between which a telegram can be sent are British Columbia and New Zealand. The telegram would cross North America, Newfoundland, the Atlantic, England, Germany, Russia (European and Asiatic), China, Japan, Java and Australia. It would make nearly a circuit of the globe, and would traverse over 20,000 miles in doing so.



COMBINED PUNCH AND SHEARS.

lying district, as many of the early miners carried their dust with them when they left the diggings for other localities.

The only authentic information obtainable is derived from the books of the Wells-Fargo Express Company. According to these records the output handled by this company from 1856 to 1866 averaged \$80,000 per month; from 1866 to 1876, \$50,000 per month, and from 1876 to 1886, \$30,000 per month, while from 1886 to the present date the product has dwindled down to about \$15,000 per month, giving an approximate of \$20,640,000 that has passed through the hands of this company alone.

J. Hyman, who was probably the next largest purchaser of gold dust, states that he bought on an average the first ten years he resided in the town \$150,000 worth per year. The next ten years he handled on an average \$100,000 per year, while he has purchased during the last ten years but about \$40,000 per year, making a total of \$3,900,000.

It is impossible to estimate the vast sums of gold that have been extracted and taken away by the Chinese during the last 40 years, but they must have been simply enormous. In 1878 there were over 3000 Chinese mining in and around Folsom, many of whom returned year after year to their native land independently rich. It is stated that a resident of the town, since deceased, sank a shaft and struck a streak of pay gravel. He immediately hired a number of Chinese to work under ground, and the first

of the river, it cannot be worked. One company did succeed in striking bedrock during a dry season, and, with three hours' work, took out over one hundred ounces of gold; but the river rose that night and flooded them out, and, although numerous attempts have been made to mine it since, none of them have been successful.

Willow Spring Hill, situated about three miles from Folsom, was for years one of the richest paying localities of this mining section. The mines were known as bank claims, and were from 30 to 40 feet in height, the gold-bearing gravel being in strata throughout the entire bank. Into these banks tunnels were run, and large quantities of powder used to blast down the dirt. After it was loosened it was hydraulicked through boxes lined with riffles, where the fine gold was amalgamated with quicksilver.

The mines of Prairie City and the adjacent ones of Rhodes' diggings were marvelously rich, producing very coarse gold. Nuggets worth as much as \$700 have been found in this section, and it has been customary for years for resident miners to search the surface after heavy rains and pick up exposed nuggets.

Mormon Island also produced vast amounts of gold during early days, as did also Mississippi and Silver Bars. These latter places are still being mined, and in spots produce well.

Many are the interesting tales related by old miners of rich strikes made in earlier days. One old pioneer was

Scientific Progress.

The Life of the Flesh.

The French call the blood "running flesh;" the Bible calls it "the life of the flesh." To the naked eye it is a crimson fluid. A drop of it under the microscope shows a nearly colorless fluid, in which float cells, called red and white corpuscles and blood plates. The red corpuscles look red only when seen in a mass; when examined under the microscope they are a pale amber color. There are about three hundred times more red corpuscles than white, but they are slightly smaller. A cubic inch of blood contains seventy times as many red corpuscles as the world does inhabitants. Their special mission seems to be to carry oxygen. They get a good supply in the lungs, and rush off brisk and rosy; they return blue and loaded with the poisonous refuse for which they have exchanged part of their oxygen. They are exceedingly busy, for they must make the trip from the lungs and back in about two minutes. Perhaps the tiny red corpuscle has had to rush through arteries and capillaries to the tip of your little finger, then back through the veins to the heart, and from there to the lungs.

If you would like to know what the effect would be should these faithful servants be unable to perform their task, wind a piece of twine several times around your finger, so that the red corpuscles cannot return to the lungs for a fresh supply of oxygen. In a short time your finger swells and turns purple. If the twine is wound tightly enough and left long enough, your finger may die and actually mortify. But you will hardly care to carry the experiment so far, but will be glad to set the little corpuscles free and let them hurry back to the lungs for a fresh load of oxygen.

The white corpuscles are cells of protoplasm, having their own work to do. Now they carry needed supplies to a nerve, now to the brain, now to a bone, building up and repairing unceasingly.

The fluid in which the corpuscles float is called blood plasma. Among other things found in it is a substance called fibrinogen, which has saved your life by keeping you from bleeding to death when you have cut yourself or have had a tooth pulled. It aids in clotting the blood, and so stops its flow. The most skillful surgeon would be unable permanently to stop the bleeding without the help of the soft, curly threads of fibrin which are formed in injured blood.

A strong muscular bag, about as large as your fist, is the powerful force pump which sends the blood on its journey to the different parts of your body. Put your ear close to some one's left side and listen to the regular rhythm of the heart performing its wonderful work.

THERE has recently been successfully treated at Halloway, near London, the largest balloon in the world. It has a capacity of 100,000 cubic feet, weighs 2250 pounds, and will lift an additional ton. It is to be used in making meteorological observations for a period of six days without descending.

A LARGER wheel than the great Ferris wheel is being erected at Earl's Court, London. It is a 400-foot wheel, and will carry 2000 people in fifty cars. Three restaurants will be built on platforms at varying heights on the supporting towers, and a ballroom will crown the towers at the axle.

A GERMAN army officer has invented a motor in which a fine stream of coal dust is utilized to drive a piston by explosion in the same manner as the gas in the gas engine.

THE use of brick-dust mortar as a substitute for hydraulic cement, where the latter cannot be obtained, is recommended by the best engineering authorities.

Growth of the Telephone Business.

When the inventor of the telephone first made known his discovery eighteen years ago it probably did not enter into even his sanguine expectations that his scheme of conveying speech by electricity would have the success it has since reached. If it had been made known first in a European country it would have enjoyed a certain measure of prosperity, limited, however, by the conservative character of the people and the difficulty of adjusting the business and social life in an old country to a new and startling change. It would have caused a jog in the life of the people such as the breaking off of a sharp bluff causes in a landscape.

But that is not the American way. The distinguishing American trait is to grasp eagerly at any innovation that holds out the promise of saving time and money. The only questions asked are: Will it be useful and will it pay? The seventeen years' use of the telephone proves that both these inquiries have been answered affirmatively. In December, 1877, a year and a half after the patent was issued, there were 5,000 telephones in use. A year later there were 52,000, and from that time on the increase has been by great strides, until to-day there are nearly 600,000 telephones in daily use in this country. The exchange system has grown from 138 exchanges in 1880 to 1400 in 1893, but the increase of subscribers to the exchanges has been much greater, the number in the United States being estimated at 240,000.

The use of this time and labor-saving invention has been greater still. In 1884 the number of telephone conversations was estimated at 215,000,000, but last year the conversations were estimated at 650,000,000, or an increase of 200 per cent., the growth of the population of the country during the ten intervening years being about 20 per cent probably. A comparison with the use of the telephone in European countries will show how much more rapid a useful invention is taken up in this country than abroad. In 1892 all of France had only 146 telephone exchanges and 20,000 subscribers, or less than half the number in New England. In all Great Britain there are 45,000 subscribers, or only one-fifth as many as in the United States. Germany has about 85,000 subscribers and Italy some 15,000. The total number of subscribers in all Europe is not more than 80 per cent of the number in the United States alone.

The financial success of the telephone has been as great as its adaptability to the wants of the public. The company that controls the telephone in this country was organized in 1880 with a capital of \$6,500,000, which had increased last year to \$20,000,000. The dividends paid during that time range from \$178,000 in 1880 and 1881 to \$3,337,500 in 1893, or a total of dividends in 14 years of \$23,106,560, and a yearly average of \$1,650,435. Such an enormous return from the creation of one man's mind rivals the glories of the achievements of Aladdin's Lamp. But while the American people are far ahead of the Europeans in the use of the telephone, the latter appear to have beaten us in cheapness. The annual rental of a telephone at a place of business in Philadelphia is \$140. In Boston the same service costs \$156 to \$180.

But in Switzerland, for instance, the use of a telephone can be had for \$16 a year. It is probable, however, that in this case the talker and the listener must go into the general stations and take their turn, instead of having a private instrument connected with a general exchange, an inconvenience that an American would not submit to. The expirations of patents, improved methods and the general cheapening of the whole process must in the near future reduce the cost of this useful service and bring it into more general use. How complicated the telephone system will then become can be estimated from the fact that on one switchboard

in a single Boston station there are 400,000 connections.

A NEW and what must prove to be an interesting field for investigation has just been suggested, namely, that of the psychology of the weather. A few observers have already paid some attention to it, and so far the results of their inquiries would appear to point to the fact that many very powerful forces, coming from what is popularly called the weather, control the operations and success of brain-workers. Experimenters and others engaged in mental tasks of an exacting description have found faulty deductions and misconception to be the result of their work in damp, foggy weather, or on days in which the air was charged with electricity and thunderstorms were impending. Indeed, deductions which seemed clear at these times appeared later to be filled with error. An actuary in an insurance company is obliged to stop work at such times, because he finds that he makes so many mistakes. A further confirmatory fact is that in large factories from 10 to 20 per cent less work is accomplished on damp days and days of threatening storm than when the weather is fine.

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Mechanical Progress.

Artificial Stone.

The manufacture of artificial stone and concrete in various forms has been practiced almost since the art of building has been known, but some German makers have hit upon a plan of imitating nature which is worthy of some notice as being out of the common. This contains from two to three parts of clay, and, when well dried and screened, it is placed, with a certain proportion of ground lime, into an iron drum kept revolved, so that the materials are thoroughly mixed together. Subsequently the mixture is removed, placed in molds, which, after being screwed down tightly, are placed in a cylinder into which water and steam are admitted. The water covers the molds, and the steam is forced into the cylinder at a pressure of 45 to 60 pounds the square inch. The steam forces the water between the crevices of the molds, the water slakes the lime, causing it to expand in volume, and as the molds resist the outward expansion the lime is forced into the sand and cements it into a hard stone. After the steam pressure has been kept for three days the molds are removed and allowed to cool for 12 hours before being opened, and then the stone is removed. Various colors can be obtained by the mixture of colored earths with the sand and lime in the cylinders. Experiments made to determine the resistance to thrusting stress of six-inch cubes of this artificial stone show that on an average three cubes of buff color crushed at 196.6 tons per square foot, while other three cubes of gray went at 186.6 tons. The stone is thus shown to be of considerable strength, while in appearance it very closely resembles natural sandstone, though somewhat more uniform in grain and texture.

Electricity's Possibilities.

Of the possibilities of electricity the prospectus of a proposed "national school of electricity," to be established at Chicago under the auspices of Edison and a number of other eminent electricians, says: "More than \$800,000,000 is employed in electrical pursuits to-day, and these figures are being increased at the rate of \$100,000,000 annually. Within a decade nine-tenths of the steamboating, railroading, canal hauling, illumination, domestic lighting, heating, cooking, factory operation, milking and machinery will be done by electricity. There are also many applications of electricity yet in an undeveloped state. Electricity is the most promising field in civilization to-day."

While the prediction that within ten years "nine-tenths of the steamboating, railroading, canal hauling, etc." will be done by this wondrous agency will doubtless prove extravagant, it is certain that the application of electricity to the practical arts is still going on, and none may venture to fix its limitations. In the single direction of urban and rural railway transportation the electric motor has made astonishing advances within the past ten years, and who can say that it may not eventually supersede the steam locomotive?—*Railway Age.*

The Trade in Flints.

The oldest industry in Great Britain—older it could hardly be, for its existence has been traced back to the pre-historic stone age—is still being carried on at the village of Brandon, on the borders of Norfolk and Suffolk, and is reported to be in a flourishing condition. It is the manufacture of gun and tinder-box flints. The work is done in little sheds, often at the back of townsfolk's cottages. It will naturally be asked, "Who wants tinder-box flints and gun flints in these days of phosphorus matches and Martin-Henrys?" The answer to the first question is that there is a good trade in tinder-box flints with Spain

and Italy, where the tinder-box still keeps its ground in very rural districts. Travelers in uncivilized regions, moreover, find flint and steel more trustworthy than matches, which are useless after they have absorbed moisture. Gun flints, on the other hand, go mostly to the wild parts of Africa.

Exclusively Electrical Power.

The new Postal Telegraph building on Broadway, New York, is, of course, lighted by electricity, and it is also the intention to use part of the current for heating and in time for cooking in the kitchen of the Hardware Club on the top story. All the elevators are run by electricity, and the same isolated plant in the basement which furnishes the current for light, heat and fan motors also operates these elevators and drives a large bank of "dynamotors," which in turn deliver current to all the different telegraphic circuits, dispensing entirely with the old-time gravity batteries. Another feature is that the electric elevators are being placed under push-button control, so that the elevator men, instead of working a lever or opening a valve, merely press a row of three buttons. This is not all, as a new device is being introduced by means of which any one waiting in the halls or on any floor can signal the next elevator coming his way to stop for him. In the operating room the message forms are distributed by a pneumatic tube system which is under electromagnetic control. Not only are incandescent lamps in use, but in the larger spaces, such as the receiving department, dynamo room, hallways, etc., arc lights are employed, all operated on the same circuit by the same current.

Lick School of Mechanical Arts.

'Tis nearly twenty years since Jas. Lick left large sums for sundry local public purposes, but several of the bequests are yet devoid of tangible form. The Lick School of Mechanical Arts has the present attention of the trustees, and a three story building 70x125 feet will be built this summer. The clay modeling department, cooking rooms and chemical laboratory will be in the basement. The science reception room, library and museum will be on the first floor. The serving rooms, mechanical drawing departments, iron and wood shops, etc., will occupy the remainder. Geo. A. Merrill, recently principal of the Cogswell school, will be principal.

A CORRESPONDENT of *Engineering* thus describes the means used for removing a shrunk on crank disk from a shaft, the shaft being in place. He says: I solved the problem, however, by drilling a 3/4-inch gas-tapping hole eight inches up the end of the engine shaft, tapping the end of the hole, and inserting three feet of 3/4-inch tube. Up this tube and hole I passed a five-foot length of 3/4-inch tube, connected at its outer end to a flexible water-hose. A good fire under the crank disk, and a plentiful stream of water up the hole in the shaft, soon did all that was necessary, and the disk was removed without further trouble. The 3/4-inch tube merely served to keep the water off the fire.

THE last census report gives \$36 per horse power per year of 313 days at ten hours per day as the average cost of steam power in the United States. This is equal to 1.15 cents per horse power per hour. It is reported that power is being contracted for at Niagara at from \$8 to \$24 per horse power per year of 365 days, counting 24 hours to the day, no additional charge being made for nights or Sundays, as the waterfall "goes on forever."

DR. SCHEELE, a New York chemist, has discovered that telephone transmitters, especially in public places, swarm with bacteria, and may transmit deadly disease as well as

sound. Diphtheria, scarlet fever and small pox are among the contagious diseases liable in certain cases to be propagated by an unclean telephone transmitter.

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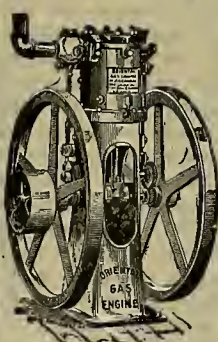
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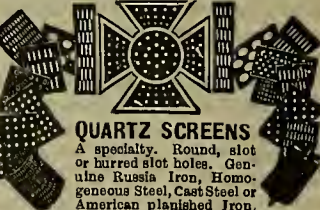
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Speed of Ocean Telegraphy.

Soon after submarine telegraph became a practical success it was discovered that the wire used for that purpose would not work as well as a land wire. With the best trans-Atlantic cables only from 25 to 30 words a minute can be transmitted intelligibly; on land lines the only limit is the skill of the operator or the speed of an automatic machine for transmitting, which latter often reaches 200 or 300 words a minute. The difficulty in cabling, long considered insurmountable, is due to the fact that an ocean wire has an insulating coat of gutta-percha; and this develops on its outer surface a certain amount of negative electricity, by induction, every time that positive electricity is sent into the wire. The phenomenon is the same as that witnessed on the outside of a Leyden jar when the inner coating is charged. It may also be observed in an instrument called the condenser. Therein a number of metal plates are separated from each other by insulating material, and alternate ones are connected among themselves, and with a common wire. Fill up one set of plates from the positive pole of a battery or dynamo, and in the other an equal amount of negative electricity will be excited. The copper core of a cable, then, is not only a conductor, but, in combination with its coating, it is also a sort of reservoir or sponge. Hence, before any of the current put into it at one end can come out at the other, a certain amount of electric energy must be consumed in the inductive process. Of course this is done very quickly; but it requires an appreciable length of time and wastes just so much current, and the longer the cable the greater the loss of time and current. Length increases the storage possibilities of this quasi Leyden jar. Unless the opening and closing of the circuit by the sender are done slowly enough, therefore, either no signals at all will be observed by the receiving operator, or else they will be faint and indistinguishable.

Now, if there could be devised a way to reduce the "electrostatic capacity" of the cable, less current would be absorbed and more would be delivered for effective use at the end of the line. Dr. M. I. Pupin of Columbia College, whose original investigations of electrical phenomena for the last two or three years have attracted wide attention, now proposes such a method. He would introduce into the line, at frequent and regular intervals, these very instruments to which reference has just been made, namely, condensers. The current sent into the first of these sections will not pass into the second, since the two sets of plates in the condenser would be insulated from each other. But a secondary current would be induced in the interposed instrument, and this would traverse the next section. Thus each portion of the line would act upon the one beyond it, so that electric action would still be manifest at the terminus as if there were a continuous conductor. One result of this arrangement would be that the electrostatic capacity of the cable as a whole would be limited to that of any one of those sections, and hence reduced to almost nothing; and that energy-absorbing phenomenon of "line" induction would be avoided. The signaling service would be performed through the inductive action of the condensers proper, and these would purposely have ample capacity, greatly exceeding that of the wire actions.

At each junction in the line a short side-track or shunt would be put in, and made to include an induction coil of enough resistance to refuse to take the main current, so long as the current was in working order. But if the latter should break down, no other route would be open, and the current would then flow through the coil into the next section.

In long distance overland telephony, as

well as in submarine telegraphy, trouble is now experienced from induction; and this puts a limit on the length of a line that can be successfully operated. At present human speech is not now transmitted more than about 1000 miles. Dr. Pupin, however, believes that his invention removes that obstacle, and that it opens the way also to ocean telephony. By a simple adjustment of apparatus he thinks the same wire may be used for both telephones and telegraphs. The cost of the appliances here mentioned introduces a commercial factor of such importance that the practical application of this idea to submarine wires may be deferred for a long time, perhaps, even though it be feasible electrically; but technical publications of high standing regard with favor the suggestion of trying it in telephone service. Here, again, the question of expense will come in. Scientifically, however, the principle is admitted to be sound.

An essential feature of this system is the "tuning" of the sections composing the line. In some recent experiments Dr. Pupin employed a circuit into which he had introduced a condenser and a self-induction coil. He then showed that such a circuit had a natural "period" of its own; that is, it would more easily transmit an alternating current of a particular frequency than one of any other frequency. If, though, he modified the capacity of his condenser, or the effect of his induction coil, the period could be changed just as the tone of a piano or violin string could be varied by altering the tension. This, then, is what he means by "tuning" an electric circuit, and, by carefully calculating the capacity of the condensers inserted in an ocean cable, the sections could be easily tuned as desired. Such adjustment would be necessary for either ocean telegraphy or overland telephony alone; and if a cable were to be used for both telegraphic and telephonic purposes, a special transformer, into which four small condensers were introduced for tuning it, would also be required at the starting point.

The condensers for submarine use, says the originator of this system, would not be the large, box-like instruments seen in laboratories, but small cylinders, or rolls of ribbon-like plates, wound about the core. About 20 of them, arranged an inch or two apart along the wire-like heads, would, he says, give the required capacity. They need not have a cross section greater than that of an ordinary cable. These groups ought to be introduced at intervals of several miles for Atlantic service, and Dr. Pupin thinks that such a cable might be constructed for only twice the cost of those now in use. On a longer line, say across the Pacific, it would be desirable to put in a proportionately larger number of groups of ribbon condensers. It has been said, at the beginning of this article, that with machines (such as the Wheatstone) 200 or 300 words a minute may be transmitted over land lines by telegraphy. On a short circuit (of a mile, for instance) such apparatus would transmit 600 words a minute, says J. C. Knikel, one of the Western Union electricians in New York. Certain conditions incident to a long line make it desirable, if not necessary, to reduce the speed. To Chicago, 200 words a minute is an average rate from New York; to St. Louis, 175; to Boston, perhaps 300 words might be sent. But Dr. Pupin thinks that his system would make it possible, both by land and sea, to transmit 500 or 600 words a minute! As yet, however, no actual test has been made on long ocean cables.

Dr. Pupin has also had in view, in devising this apparatus, the electric lighting of harbor buoys. Such buoys, whenever tried, have been supplied with an alternating current through a cable resembling that employed for telegraphing across the Atlantic; and the difficulties incident to thus transmitting the electric fluid have threatened to render the whole idea impracticable. With

a "tuned" cable, though, the problem is solved. Hence the principle of "resonance," to employ another musical simile, here finds one more useful application.

Comparative Cost of Electrical Equipment.

A recent number of the *Electrical Review* contains the following interesting matter in relation to the comparative cost of electrical equipment of street-car systems now and a few years ago: "Six years ago the price for a complete equipment for a trolley car, including two motors, was about \$4500. This price held for a year and a half, and then dropped to \$3850, \$3500 and \$3300, until, two years ago, it was about \$2850. One year ago \$2000 was the price of the same equipment, greatly improved in quality and efficiency, while to-day the average price is between \$1000 and \$1200. We have been told of an electric railway manager who desired quite recently to purchase an equipment for a single car. He wrote to seven manufacturing companies and immediately was called upon by seven salesmen, all of whom had paid traveling expenses to try for the order. The prices ranged from \$1500 to \$640. The manager bought the \$640 apparatus. Here we have a decrease in actual selling prices from \$4500 in 1888 to \$640 in 1894, a period of six years. In 1888 there were seven electric railways in operation and in process of construction. In January, 1890, there were 162 electric railways in operation and in process of construction. In January, 1891, this number had grown to 281, while to-day there are probably over 500 cities in the United States equipped with electric roads, many of them of great mileage, as in Boston, Brooklyn, St. Paul, Minneapolis and Cincinnati.

New Atlantic Cable.

It is expected that the new Atlantic cable, the third and largest of the trans-Atlantic news-carriers, will be completed to-day. The steamer Faraday has been engaged in reeling out the new cable from the coast of Ireland to Canso, Nova Scotia. One hundred miles on the Irish coast and 400 miles out from Nova Scotia were run out first and then the 1500 miles connecting the two "huoyed up" ends.

IN REPLY to a suggestion made by the *American Machinist* that all steam fire engines should be self-propelling, a correspondent of the *Electrical Review* proposes that fire engines be operated by electricity. His fire engine would be an electric pump mounted on a light truck. A system of electrical supply similar to a lighting system would furnish current. Switches enclosed in accessible boxes on the streets would be distributed the same as the fire hydrants. After the engines had been run to the fire, presumably by horses, connection between the electric pump and the street switch would be made and there you are.

SELDOM is noticed mistakes in other papers, for all mankind is prone to err, but the following from *Pearson's Weekly*, an English publication, is so irresistibly funny that it is given place. Talking of mica, our trans-Atlantic contemporary says: "Mica is chiefly made use of for dynamos, electric alternators and transformers, and also for placing at the ends of cables for the purpose of absorbing the electricity which lingers in the wire after a message has been sent, the presence of which would affect subsequent messages."

IT IS probably not widely known, says the *Electrical Review*, that only seven out of the 17 trans-Atlantic cables are in use—ten having given out from various causes. Estimating the cost of each cable at \$3,000,000, here is an irreclaimable investment of \$30,000,000 safely buried beneath the ocean to a depth ranging from a few fathoms to over five miles.

Practical Information.

From Grains of Wheat to Flour.

One who has never been in a flouring mill of the largest size cannot realize what a peculiar lot of noises are made by the machinery. As soon as the wheat enters the machine from the long spout which brings it down from the upper floors, it falls between two rollers of iron—"chilled" iron, they call it, and very hard iron it is, too. One of these rollers revolves rapidly, the other more slowly, in order that the separation of the coat, or bran, from the kernel may be more easily accomplished.

The wheat first passes between rollers separated just enough to allow the coat to be crushed. It is then carried away up to the top of the mill again to a room where the sun vainly tries to shine in through the flour-coated windows far above the city's roofs. It next passes over a wire sieve, which separates the bran from the kernel proper.

This bran, which contains much of the flour material, again passes down and is ground once more, this process being repeated four times, making five grindings, each one finer than the one preceding it.

Each time the fibrous or bran portions are more completely separated, and at last the bran comes out a clear, brownish husk, with every particle of flour removed.

The inside part of the kernel has meanwhile been going through a very interesting process. After the first grinding or breaking, it passes to a big six-sided revolving wheel, covered with a fine wire netting or sieve. Through this reel the finer portions of the kernel pass, coming out in what is called "middlings," a granulated mass, which goes back to the rollers for another crushing.

The process is repeated through five reels, all but the first being of silk. The last one has 120 threads to the lineal inch. The flour which comes out of the fifth reel, while white in hue, is yet not of the finest nor "patent" grade, but is classed as "haker's" or second-grade flour.

The middlings above referred to are purified by an interesting process. They are passed over a fine wire sieve, through the upper part of which a strong current of air is passed. This holds in suspension the tiny portions of fibrous matter which may have been in the flour, and, at last, after this process of middlings purifying has been carefully carried out, the flour appears a spotless, shown white—the "patent" flour, as it is called.

In the process of grinding in this gradual and repeated way the germ of the wheat—a tiny particle about the size of a mustard seed—is separated from the white flour. It is what one might call the life part of the wheat.

If it were ground up it would not leave the "patent" flour so white and powdery, so it is separated in one of the sievings and passes into the darker or lower grade of flour. It contains, however, the best and most nutritious part of the wheat.

The last thing that happens to the pulverized kernel before it is ready for market is the filling of barrels or sacks. Down many stories through a smooth tube comes the white or patent flour. Under the tube is the harrel or sack, as the case may be, and, as it begins to fill, a steel anger just the size of the barrel bores down into the flour, packing it carefully and solidly beneath the broad blades.—St. Nicholas.

ACCORDING to Professor Bemis' figures, based on the census statistics of 1890, the average wages of the 24,323 miners in Illinois were only \$6.87 a week; of the 19,591 Ohio miners, \$6.76; of the 53,780 bituminous miners of Pennsylvania, \$7.55, and of the 70,669 anthracite men, \$6.21. The report for 1892 of the Ohio Bureau of Labor Statis-

tics confirms this, for it gives the average weekly earnings in 1892, in that State, as \$6.67. In most States wages average about \$2 a day when the men have work, but this is not usually over 200 days in the year.

A New Way to Retort Gold.

We recently asked a miner who was getting fine gold by slicing how he saved it. "I use silver," he said, "and squeeze it through calico, and when I have got the amalgam as hard as I can—" "You retort it," we said. "No, I don't and yes I do—I don't as you mean retort, but I do as I mean it myself. I get a potato, cut off one end, and scoop out a cavity in it large enough to take my ball of amalgam. I next take a spade or piece of flat iron, and place that over the fire; and then upon that I place the potato with the cut side down. As the amalgam gets hot the silver evaporates and goes all through the potato; but it can't get through the skin, and neither can it escape by the iron, for the spud is stuck to the spade. When it is done I take the spade off the fire and let it get cool, and then I have my gold in a button on the spade and my silver all in fine globules in the potato. I break that potato up under water and I have all my silver. Many persons don't believe this can be done, but I tell you it can, sir, and I tell you, also, that I don't know how it is but my gold is always of a good color, and I've often wondered if the juices of the potato have anything to do with that."—*Australian Mining Standard*, April 21.

A Curious Puzzle.

Open a book at random and select a word within the first ten lines and within the tenth word from the end of the line. Mark the word. Now double the number of the page and multiply the sum by 5. Then add 20. Then add the number of the line you have selected. Then add 5. Multiply the sum by 10. Add the number of the word in the line. From this subtract 250, and the remainder will indicate in the unit column the number of the word, and in the ten column the number of the line and the remaining figures the number of the page.

The Main Full of Beer.

"The most curious thing I saw in Europe," remarked Wm. M. Hoff, of San Francisco, who has just returned from a tour of the old world, "was the manner in which beer was served at Stuttgart. It is piped all over the city, just like water, and the consumer pays a beer rate, just as he pays water and gas rates. Two immense breweries furnish the supply, and because of their political 'pull' they have monopolized the entire beer trade of that immense city. Their mains make a perfect underground network, with smaller pipes tapping them at distances of twenty to fifty feet. The pipe is made of a lead composition, and to preserve the heverage from impurities which the chemical properties of the beer would generate in contact with the metal, the pipe is lined with a thin layer of wood pulp. This makes it possible for every man in Stuttgart to be his own bartender. All he has to do is to turn the spigot and the pipe does the rest. The pipes, of course, are air tight, so that the amber liquid is as pure and sparkling when drawn in one's home as when taken from a bottle or passed over the bar by a knight of the apron. You can readily see how this system of serving beer cheapens it to the consumer. It does away with an army of middlemen, for every family who patronizes the breweries gets the heverage first hand. This unique experiment has already become an established success in Stuttgart, and is growing in popularity so fast, that every large city in Europe is talking of adopting it."

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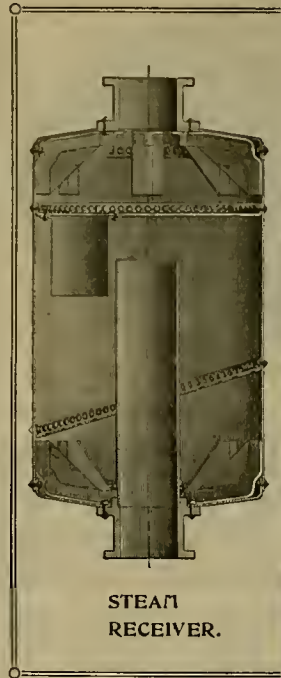
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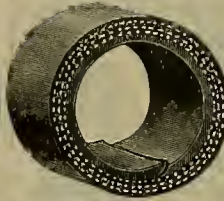
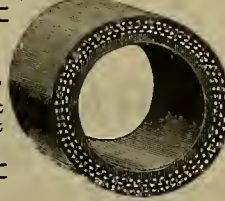
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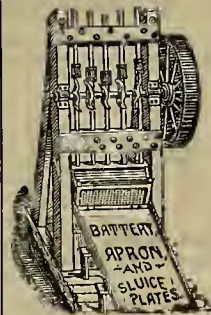
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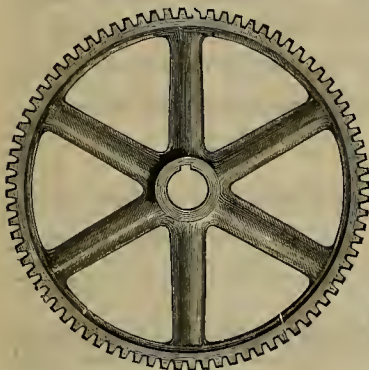


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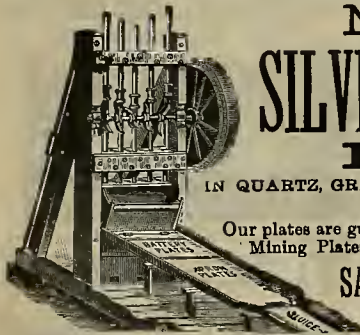
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Mining Summary.

The following is mostly condensed from journals published in the interior, in proximity to the mines mentioned.

CALIFORNIA.

Calaveras.

LAKE LOCATION.—Ankels Echo: Professor Brooks, who recently bought the Viertong mine, near Tuttle town, Tuolumne county, has bonded the Ferguson-McArdle mine, located on the south bank of the Stanislaus river. The north boundary of this mine is located near Wood's Ferry, on the Tuolumne side, running thence south 12,500 feet along the main road to Sonora. He has also obtained a bond on the Brown mine, owned by Boye and Miner. This means a large property for a solid company, as it is a well-established fact that gold exists in large quantities in Jackson Hill, which forms a portion of this immense mine.

MANUFACTURED COPPER.—Echo: We have been handed a specimen of copper manufactured at Copperopolis by electricity, or by what is known as the new system of producing that article. The specimen shown us was produced in something less than six hours and is about the sixteenth of an inch thick. If gold could be produced by a like process it would knock out the gold bugs of Wall street in a jiffy.

Del Norte.

AFTER A BIO MONEY.—Speaking of the revival of gold-mining in the State, the *Crescent City Record* expresses the opinion that before long the unexplored sections of Del Norte will receive a thorough prospecting. "It is well known," says that paper, "that in early days the country was prospected, but the men who went over the ground were in search of big money and washed a pan of dirt here and there." It appears that, though since that time quartz leads have been discovered all through the mountains to within a short distance of Crescent City, very little prospecting and no real development work has been done. The *Record* doubts whether there is another county on the coast with a greater variety of minerals than Del Norte.

Inyo.

RANCHO CANYON.—Register: The Georgia mine, owned by Geo. F. Willis and others, is being worked at depth, and shows a good grade of ore. The last five tons extracted will probably mill \$50 per ton.

N. W. Willis is getting some very good ore. The report has been widely circulated that the "gold does not go down in the Inyo mountains," and that one can hope for nothing but surface "prospects." However, the results so far as can be known from the deepest workings here (about 200 feet) seem to prove the contrary.

Geo. Story has just finished an arrastra, and will soon start up on ore. He has a Pelton motor for power. His arrastra is about three-fourths of a mile below the one owned by Geo. F. Willis. The owners of the Georgia will furnish a run of 25 tons of rock in a few days that promises to excel in richness anything that has been run from that mine as yet. There will be considerable custom rock run at the Willis arrastra this summer.

FINE MARBLE.—Independent: Recently two carloads of very choice marble were sent out from the Inyo quarry. The blocks weighed about ten tons each. There are orders now on file for marble that will keep the mill running day and night for the next six months to come. Mr. Holmes, superintendent, has lately opened up an immense body of marble different from any yet found there. He says the ledge is over a mile long and a hundred feet wide. Mr. Holmes says he could take out blocks twice the length of the Washington monument "and without a flaw."

Mono.

WEEKLY LETTERS.—Supt. Kelly's official letters for week ending June 3d are as follows: Bodie.—During the past week north drift from No. 1 west crosscut, 300-foot level, was extended 10 feet. The face is broken up, but the bunches of ore through the porphyry are good grade. Winze from above drift was extended 8 feet. The ore in bottom is about 12 inches wide and good grade. Commenced crushing ore in the Bodie mill on the 30th of May; crushed 71 tons; average battery sample, \$37.08; average tailings, \$9.38. There were employed six miners, one engineer, one carman, one carpenter and, jointly with Mono, one engineer, one blacksmith, one watchman, one foreman. Mono.—During the past week we cleaned out and timbered No. 1 east crosscut from main south drift, 550-foot level, a distance of 60 feet. There were employed two miners and, jointly with Bodie, one engineer, one blacksmith, one watchman, one foreman.

Nevada.

CHANGE OF OWNERSHIP.—Union: The Osborn Hill mine is now owned by the company that has been operating it for the past 18 months under a bond. Yesterday the balance due on the purchase price, amounting to \$30,000, was paid to Messrs. Robert Smith and William Campbell and Mrs. John L. Smith. The Phoenix mine was bought by the Osborn Hill Company last Monday for \$60,000. It was owned by Edward and John C. Coleman, Wm. Campbell, John Glasson, A. Burrows, George Campbell and Mrs. Mary J. Neelis. It adjoins the Osborn Hill mine.

Siskiyou.

MINING NOTES.—Journal: Austin & Co. still continue to take out good pay from their claim at Greenhorn, about a mile south of Yreka, with prospects of improvement as the claim is opened to better advantage. They realize steadily from \$800 to \$900 of gold dust per week, and employ about 20 hands. Newt. Lamb, who has commenced opening a

claim farther up the creek, has the pumping machinery in operation, and will soon commence tunneling along the bedrock from the pumping and hoisting shaft.

Plumas.

J. P. Welsh of this city has bonded the Glazier mine at North Fork and will work it with a force of men. Mandeville and Rickard have a ledge the croppings of which show free gold, and which they will develop this summer. It is the general belief that rich gravel exists deep down a hundred feet or more below the surface, not only on Greenhorn, but in many other sections of Yreka basin.

At Salmon river, the miners are all very busily engaged with an abundance of water, and expect to take out more gold this season than ever before. The hills and gulches are full of industrious prospectors, and more are coming every day to try their luck in that extensive mining region, where gold can be found in the gulches, creek and river beds and mountains both in quartz and gravel. The mountains are still covered with a great amount of snow to keep the small streams and ditches supplied with water for mining purposes until the winter season is again upon us to renew the supply.

Tuolumne.

Independent: The Buchanan mine directors have levied an assessment. We hope that this is an indication that the grand old mine will soon resume operations to purge the yellow metal still pressing its plethoric stomach.

The Dead Horse mine suspended operations at its mill last week. The superintendent, Capt. Thomas, will for a time prospect at the 1300-foot level in the hope of getting better payable ore. The main shaft is sunk 1340 feet, and at this depth thousands of tons of ore are available, but it is not as rich as the company desires, hence the above operations.

The late rains and fall of snow in the mountains will extend the mining season next fall for those who depend on a water supply. The present prospects are encouraging for a long and profitable mining harvest.

NEVADA.

Washoe District.

ORE FROM THE CON. VA.—Enterprise: The first shipment of ore from the Con. Virginia mine to the Morgan mill was made Sunday. The ore was taken from the new bonanza on the 1650 level some time ago, and has been held in bins at the mine. Returns from the ore will be awaited with great interest.

The work of pushing the 1700 foot drift toward a point beneath the ore find on the 1650 level, has been progressing rapidly, and the objective region will be reached to-morrow. The drift continues in low-grade quartz.

EXCITEMENT AT KENNEDY.—Walker Lake Bulletin: The excitement over the rich strikes in Kennedy is increasing every day. All who visit the camp agree that it more than equals any former discovery in the State, some not even excepting the Comstock.

There have been over 400 locations made, and all that work has been done on show good healthy ledges that assay well in gold—some very high, but all good enough, with a mill near by, to work at a handsome profit. The Imperial, which was purchased by Mr. Wardner, has over 4000 tons of \$30. ore uncovered that can be taken out in short order and milled at very slight expense, and the chances are that by the time that is taken out he will have as much more uncovered, as he intends pushing the tunnels right in, and from the croppings it looks as if the ledge extends the whole distance of 4300 feet that he owns.

ARIZONA.

GENERAL NOTES.—Journal-Miner: The Socorro smelter has sent notices to its patrons announcing that it will close on June 15. Many of the smelters have been running at a loss, and it is not unlikely that others will follow the example of the Socorro one.

The mill owned by Messrs. Rucker & Morse on Lynx creek is running right along with good success. This district has resumed its old-time activity again and gives great promise for the future.

Major W. A. Rowe is still at work on the Shelton group of mines in the Lynx Creek district, and he reports the property looking splendid. He has recently struck a very large chute of good gold ore on one of the claims in a new shaft which he is sinking.

John S. Jones is sinking a well on Big Bug, with excellent prospects of obtaining a water supply, which, added to what he has at present, will enable him to run his mill the entire year. He proposes to sink fifty feet and then crosscut across the creek.

A large body of very rich ore was struck in the Railroad mine, in the Hassayampa district, which is being worked under lease by Messrs. Fisher & Wood. The ore was struck in the winze which is being sunk in the upper tunnel of the claim.

Water is reported becoming very scarce in Martinez creek, from which the Congress obtains its supply for its mill. The Congress managers have been drifting under the creek, on bedrock, for the purpose of increasing the supply, and have partially succeeded, but the outlook is not encouraging and the mill may have to be closed down yet this month for lack of water.

Sam Hill, who recently took a party of mining men into Tonto Basin, reports that district as being quite active. Two mills are running in the district. J. I. Coleman's mill is running on custom ore, while the Lackawanna is running on ore from the mine of the same name. William Murphy is developing a claim owned by him and Dennis Burke. The Zulu is idle at present.

A \$10,000 bar of bullion was brought in last evening from the Crowned King mine and was

shipped to-day to be worked up into coin of the realm. This mine is a bullion producer, but just at present the water supply is getting somewhat scarce, and the mill cannot be run on full time. During the time that they were saving the above-mentioned bar of bullion, several thousand dollars worth of concentrates were saved and shipped, while a part of the ore is rich enough for shipment without milling.

Just as Jacob Henkle and D. F. Mitchell succeeded in opening up their Rapid Transit silver mine, in the Bradshaw mountains, to an extent that it could be placed among the dividend-payers, silver took a tumble, and they have been compelled to let it lie idle until the grasp of the gold monopolists is released from the throat of the silver industry. While the Rapid Transit lies idle, the enterprising ex-sheriff of Yavapai county has not been idle, but has secured a good gold claim in Lynx Creek district and is engaged in working it energetically. He has good prospects of retrieving from this property what he spent on his silver mine.

THE JUMBO.—Kingman Miner: The main shaft of the Jumbo mine, at Rustler, is now down 50 feet, and still going down. The ore shows up nicely all the way down, with the exception of a slight break at a depth of 20 feet. The three-foot ledge will mill \$60 just as it is taken from the shaft, while much of it can be assayed to 15 to 18 ounces in gold. The ore is perfectly free, and as soon as the mine has been exploited to a depth of 150 feet a mill will be erected on the river for the reduction of its ores.

RICH OAS.—"Chas. Sherman's Distaff mine, at Chloride, in Mohave county," says the *Miner*, "turns out some of the richest ore in the country. It is developed by several thousand feet of tunnels, shafts, winzes and raises. Something like \$150,000 has been taken from the property since it was first worked, and it is still, in spite of the low price of silver, being worked for its rich ores. The main shaft, where the hoisting works are erected, is down 225 feet. The shaft is double compartment and is timbered with square sets."

The *Gazette* reports a rich quicksilver discovery in the vicinity of Hassayampa canyon, 60 miles northeast of Phoenix, by J. Goodin. The ore bears all the appearance of very rich cinabar, yet at the same time contains both gold and lead. By the simplest tests Mr. Goodin has extracted mercury from the ore and in extraordinary quantity. He has about 12 feet of the ore, in strong ledge formation.

JOURNAL-MINER: An important placer mining enterprise is assuming shape in the Black Canyon country. The promoter of it is W. D. Church. About 3000 acres of rich placer ground has been located there, and it is said that it will be worked on an extensive scale.

COLORADO.

THE SAN JUAN COUNTRY.—Record: A stream of prospectors, miners and capitalists is pouring into Bear creek over in the San Juan country. The camp promises to be one of the biggest gold and silver districts in the State. Moss-covered rock will pay to ship, indicating that the pay streak outcrops to the surface.

Wm. Bemrose has opened up thousands of tons of gold ore on his Hoosier gulch placer with 400 feet of work, says the *Summit Co. Journal*. The extent of the vein is not known. Two men extracted 3000 tons of ore the last winter and did not use any powder.

A BIO LAWSUIT.—A great lawsuit is liable to arise as to the ownership of the Kansas and Burroughs ore veins, now estimated in value at \$250 per foot or \$2,150,000 for the 10,000 feet included in the claims of both companies. The difficulty arises in this way: The two veins form the sides of an elliptical "horse," of irregular outline, for a distance of some 2500 feet. The lines come together at the ends of this "horse," remain so for a time and then depart in different directions. Where the "horse" prevails each vein dips toward the other, so that as depth is gained they must come together, to so remain or again depart. Development alone can demonstrate this.

When the veins come together below, who will own the ore, the proprietors of the Burroughs vein or the proprietors of the Kansas? One of these companies claims the oldest location, the other claims the apex of the common vein, if it is common in the sense of being one and the same, and separated for a distance by the intrusion of non-mineral matter called a "horse." The apex law was passed by Congress in 1866, at the instance of Delegate Chaffee, and prior to that time, location took precedence in the Gilpin county camps. As both of the veins were worked before 1866, it can easily be guessed that a great deal of ancient history will be unearthed should the rumored suit be brought in the courts.

The *News* thinks that the sensible way out of the difficulty should the veins come together below, as they now threaten, is to consolidate all interests into one company. Millions have been taken from the Kansas and Burroughs, without decreasing in the least the millions more in sight. It is very rich ground.

The territory which separates the two mines, called a geological "horse," was located and patented by J. B. Keeler as early as 1879, under three several titles—the Jay Gould, Welcome and Chicago. There is a shaft on each of these mines and in all of them ore has been found. This disturbs the "horse" theory, as that title is applied to barren ground surrounded by ore veins, like a long peanut in a piece of candy. Four years ago good ore was being extracted from the Welcome.

IDAHO.

TRADA DOLLAR.—Avalanche: About 60 men are employed at the mine and mill. Considerable development work is being done outside of the regular mining operations necessary to keep the mill running steadily. Two drifts

are being extended into the Four ground—the adit or Blaine tunnel and No. 3. The face of the adit is in fine ore, the pay being from two to three feet in width. Most of this ore is stripped and left standing on the footwall. Within the past few days the face of No. 3, which has been full of quartz stringers, has made a nice streak of ore, and is looking very favorable. In the numerous stopes, and in the drifts from the upraise, work is progressing favorably and some very rich rock is being extracted.

GIBBONSVILLE DISTRICT.—A Butte correspondent writing from there says: There has been a great revival in the mining industry in the Barclay section of our camp. The people are far more hopeful for the future of Gibbonsville than for a long time past. The operations of the American Developing and Mining Company have put new life in the camp. Their mill is running full time on ore recently bought of Hubbs, Barton & McMahon, at their lower tunnel, which is being run to open all their back leads. They have a force of men excavating for the foundation of an air-compressor, which is to be placed at the mouth of the tunnel for the purpose of supplying compressed air for the Burley or Ingersoll drills which are to be used in extending this tunnel, which is now in 1500 feet; also for the ventilation of the mine.

NORTH SIDE MINING IRMS.—Coeur d'Alene Sun: There are 11 men employed by the Nugget Company—four on the night shift and seven on the day shift. A great deal of gravel is being washed.

Five hundred pounds of powder were fired off by the Arizona Placer Company on Friday on Gold Run. It raised the 60-foot gravel bank several feet and left it an easy prey for the magnificent water power of the company.

The Vestal Con. Company fired off a 250-pound powder charge during the week, and broke down an immense amount of gravel.

The lumber for the new Daddy quartz mill will be sawed during the coming week. The mill is expected to make industrial music on the 4th of July.

George Ives has had a force of men at work cleaning out the Missoula ditch for an increased supply of water in Dream Gulch. The work is about finished.

MEXICO.

SHIPPED TO ENGLAND.—Vidette: Another bullion producer has been added to the mines of Sonora. The mine is located just across the line, a few miles from Bisbee, in the Cananea mountains, and runs heavily in copper. The quantity of ore is large and there will be three furnaces in operation by the middle of this month. The product is shipped in bond to England, the first lot going this week, which is expected to be followed by numerous heavy shipments. John Weir is the representative of the company.

MONTANA.

A BIO MINING SUIT.—Inter-Mountain: Howard H. Zenor of Deer Lodge, one of the original locators of the Comanche mine, has brought suit against P. A. Largey for the annulment and cancellation of a deed conveying to Mr. Largey a one-fourth interest in the Comanche. The plaintiff alleges that on October 11, 1883, he was the owner of and in possession of a half interest in this property, and that the defendant by force and fraud and misrepresentation, and by threats and intimidation against the plaintiff and without consideration to him compelled him to make and execute and deliver to the defendant a bargain and sale deed conveying to him a quarter interest in the said claim. This deed the defendant recorded. In September, 1893, the plaintiff alleges he was made aware of the fraud and misrepresentation whereby the defendant had obtained the deed and a demand was made that the property be reconveyed to him. The value of the fourth interest is \$50,000.

MINING NOTES.—Inter-Mountain: Stacey & Dickey of Rochester shipped a car of gold ore to Butte this week that went \$100 to the ton.

J. H. Vanderheck of Virginia City shipped a car that averaged 75 ounces in silver and \$60 in gold per ton.

A shipment of 50 tons of manganese ore was made from the Mono mine, one of the Blue Bird Company's claims.

Bennett & Clark, leasing the Goldsmith No. 2, shipped 50 tons of ore during the week, that went 150 ounces in silver and \$30 in gold to the ton.

The Golden Sunlight Company has not yet let the contract for the proposed 150-ton concentrator, but it is expected to be let during the coming week.

The Basin Times reports that a rich strike has been made in the Lone Star mine, owned by Samuel Mulville. It is being worked under lease by L. A. Sisley and others, who have it bonded for the sum of \$50,000.

A force of about 40 men is engaged in building a concentrator on the Katie mine at Basin. Mike O'Donnell has been paid \$20,000 cash of the \$30,000 due him for a one-third interest in the mine. The balance is payable in October.

Fine & Pankey started up their Bryan mill last week. This is an annex to the regular mill. It receives the tailings from the vanners. The tailings are pressed dry, then roasted, and after being thoroughly chloridized are worked through pans and settlers.

Col. Johnson is back to his old stamping ground on Richmond Flats from North Carolina. It was Col. Johnson who sold the Revenue mine for \$180,000 six years ago. About 30 days ago he returned and immediately started work on a mine next to the Revenue, and during the week made a shipment of one carload.

NEW MEXICO.

MOOOLIONS.—Silver City Enterprise: Forty carpenters are employed on the new Confidence

mill on Whitewater, and every nerve is being strained to have the mill ready for operation by September 1st. The road will soon be ready for hauling ore over, and then the thousands of tons of ore on the dump at the mine will be taken to the mill. After the ore is removed from the dumps at the mine, ore bins will be put in place, which will facilitate the loading of ore. As soon as these bins are in place work will be resumed on the mine under the superintendence of John T. Mitchell.

WHITE SIGNAL.—This camp is situated on the eastern slope of the Bnro range of mountains. The center of operations is in the neighborhood of Donaldson's pump station. Recently, however, in the great rush for gold, attention has been attracted to these mines. The geological structure of the veins bears a strong resemblance to many of the Mogollon series. A large body of conglomerate quartzite runs through the district from north to south for a distance of 10 or 15 miles. On either side of this quartzite, porphyritic felsyte, rhyolite and other porphyritic rocks predominate, with occasional bodies of leptonite or metamorphic granite, all of which are heavily impregnated with iron, so much so that the dark oxides of this mineral give the massive rocks a somber hue. From both sides of the great band of quartzite before mentioned, several series of porphyry dykes seem to project at various angles. These rifts or dykes of porphyry are from 8 to 40 feet in thickness and traceable from a few hundred yards to a mile in length away from the quartzite. On one side of these porphyry dykes, and in many instances on both sides, and in immediate contact therewith, are found gold-bearing veins. So far there have been discovered and located somewhere in the neighborhood of 60 claims. The veins vary in width from six inches to three feet, and in value from \$8 to \$20 per ton in gold.

REPORTED STRIKES.—*Enterprise.* Messrs. Kline, Marty and Professor Miles are working a gold property in the south end of the Bnro mountains. The vein is from 6 to 40 feet in width and assays from \$8 to \$20 per ton in gold. They intend to sink to a depth of 100 feet and then arrange for reduction works to mill their ore.

A strike of rich gold ore has been made at the southeast end of the White Signal camp near Thwaite's ranch. The ore assays from \$10 to \$200 per ton and is found disseminated through an immense mass of quartzite all of which will pay so far as developed.

On the Texas mine sinking has been resumed from the 200-foot level. In the bottom of the shaft very rich ore has been encountered; the ore will run \$50 per ton in gold and 200 to 400 ounces per ton in silver.

COCHITI DISTRICT.—*Record.* New strikes of ore running from \$32 to \$100 per ton are so frequent in the Cochiti district that they excite very little comment. Returns just at hand from Burlingame show \$700 ore in a new prospect in Cella canyon. In the Lone Star tunnel a rich vein of \$400 ore has been struck, and when roasted it shows blisters of gold. That the principal mines run high in tellurium is now settled beyond all doubt. A fine body of mineral similar to that in the Crown Point, has been uncovered in the Miners' Union claim in the west fork of Pino canyon, over a mile from the Crown Point. In Cochiti canyon the Little Colorado claim, owned by La Junta parties, reports a new strike, assay returns from which have come to hand from Pueblo. It yields \$41 in gold and \$35 in silver, making a total of \$126 to the ton. Near Bear canyon, ten miles south of Pino canyon, some fine ore is being extracted, and the ledges are similar to those in the Lone Star. One claim, which shows 12 feet of quartz, gives an assay return of 1 ounce in gold and 3 3/4 ounces in silver. The same croppings are found near Borego Springs, and things are lively in that locality.

A LITTLE CALCULATION.—*Socorro Chief.* To run a five-stamp battery it takes 15 tons of ore per day. Each ton of common quartz ore has about 20 to 22 cubic feet in it. At 30 days in a month, for six months, it would take 2700 tons of ore, or 54,000 cubic feet of ore, to keep the stamps running. The Wall Street, of Water canyon, is doing this, and could keep ten stamps running for some time. Talk is cheap, but it takes money to buy saw-logs, and lots of ore to run a mill. And when other places are doing their booming, remember that the Wall Street, in Water canyon is doing this.

OREGON.

SOUTHERN OREGON PLACER MINES.—Considerable interest is caused in the vicinity of Medford by the result of a partial cleanup of the Miller placer mine, situated about five miles west of that city. The mine was recently purchased by Portland parties, and between \$12,000 and \$13,000 has been taken out as the result of the past run. A partial cleanup of the Sturgis mine, about 12 miles from this city, which was finished last week, produced \$30,000 in yellow metal for its owners. These mines are considered two of the best placer mines in southern Oregon, and the result of the cleanup of both has been watched with interest by mining men all over the State. The Miller mine comprises about 240 acres, all of which is considered as good as that worked in the past, only two acres of which has been touched during the last eight years. The mine has been run with only one giant, and the present company is making arrangements to put in two more giants.

BULLION FROM CORNUCOPIA.—*Baker City Democrat.* About 100 pounds of bullion in bricks was on exhibition at the First National Bank of Union Saturday. It was sent in by Mr. Fred Steen from Cornucopia, and is the result of his work upon the tailings from the mill of the Oregon Gold Mining Company. The bullion

was principally silver, although it contained some gold.

UTAH.

S. L. Herald: The Bullion-Buck people at Enreka are employing over a hundred men and shipping a great deal of high-grade ore, and have from 70 to 100 tons of low-grade ores on the dump that will be of great value to the company when they get a mill erected for treating them. At present they are not worth shipping. The company is preparing to put in a mill, at an outlay of from \$50,000 to \$60,000, for the treating of their low-grade ores. On the 2d inst. the company paid a \$50,000 monthly dividend, or 50 cents per share on the capital stock of the company.

Bingham Bulletin: The Stewart mill is a sight worth seeing. As to its perfect work, the many gold bricks—ranging in value from \$500 to \$18,000 each—which it has been turning out during the past year are sufficient proof. The five Huntington mills are kept in constant operation, and from 50 to 60 tons of ore is being put through daily.

THE LITTLE PITTSBURGH.—*Record.* An important discovery has been made in the Little Pittsburgh group, situated in the northern part of the Mercer district, over in Utah. Milling ore in a vein 25 feet thick, and no foot wall yet, is the claim made by the operators and those who have visited the workings. Assays show the value to be from \$6 to \$7 per ton, and picked samples give returns as high as \$23.

WASHINGTON.

GOLD MINING AT WENATCHEE.—*Report.* D. E. Bigelow, manager of the Wenatchee Gold Mining Company, gives an encouraging report of his property, which is located about two miles from the town of Wenatchee. The company has a five-stamp mill in operation. The ore, of which they have a great supply, is a partially decomposed quartz and carries sufficient gold to insure handsome profits from the running of the mill. The ledge crops out for two miles and the ore is easily taken out. The mine is so accessible that the delivery wagons from the Wenatchee stores drive up to the works. Mr. Bigelow thinks they have an inexhaustible supply of ore to run on and is sure that the property will in the near future be one of the large gold producers of the State.

Coast Industrial Notes.

—The Edison Light & Power Company yesterday paid its monthly dividend of 66 2/3 cents per share.

—The sealing fleet report a very large catch. So far four vessels have been lost, and six are missing.

—The California Electric Light Company paid its monthly dividend of fifteen cents per share yesterday.

—The Canadian Pacific will build a new steel bridge over the Columbia River at Revelstoke, B. C., this summer.

—From five to ten dollars a day were the recent ruling wages for fighting the flood and saving property in Portland, Or.

—A large grain warehouse and elevator is to be built at North Seattle, Wash. The company is to be capitalized at \$300,000 to \$350,000.

—British Columbia mill men are buying logs in Washington and towing them to their mills. Just a year ago precisely the opposite condition of affairs existed.

—Dodge, Sweeney & Co. have bought the Alaska Packers' Association's salmon pack of '94 in barrels and half barrels at \$6 for barrels and \$3.50 for halves. This is \$2 lower than '93.

—The Potrero & Bay View Railroad Company has filed articles of Incorporation, to build a road from Post and Montgomery streets, San Francisco, to the Bay View race-course, or to Hunter's Point.

—The separation of the Oregon Railway & Navigation properties from the Union Pacific system under a separate receivership had been arranged to take place to-day, but the damage of the great flood has compelled indefinite postponement.

—The twenty-second payment to the Union Iron Works on account of the construction of the Oregon, amounting to \$96,684, has been deferred until the naval appropriation bill passes, as there are no funds available for this purpose.

—The Union Iron Works in May sent a complete sixty-stamp mill to the Apollo mine, Ungra Island, Alaska. They also furnished a twenty-stamp mill to the Osborne Hill, at Grass Valley, and sent a ten-stamp combination process mill to Weber, Idaho.

—R. B. Langdon & Co. of Minneapolis have secured a \$2,000,000 canal contract in Arizona. The country to be irrigated is 400,000 acres, mostly in Maricopa county, and the water to be obtained is from the Rio Verde. The canal will start above Phoenix and be 100 miles long.

—Work on the new reservoir for the Paso Robles Water Company has commenced. It is to be built east of town in the Callender tract. The capacity will be 1,200,000 gallons and the cost \$6000. New ditches are to be dug, new pipes laid and new mains put

in, and the whole cost is estimated at \$15,000.

—The annual statement of the Pacific Mail Steamship Company for the year ended April 30 shows a balance of receipts over expenses of \$475,461. There was a deficit last year of \$56,740. The statement is reiterated in some quarters that the company is in financial stress and about to pass into the hands of a receiver.

—The local trade in concentrators is good. The Risdon Iron Works have an additional order for thirteen from the Apollo Consolidated Mining Company. George E. Woodbury has recently sent twelve to Colorado, three to Australia and three to Oregon. The McGlew Company report six sent to Grub Gulch and two to Nevada.

—The Union Gas Engine Company of 221 First street are finishing the construction of a seventy-horse-power gasoline marine engine for J. S. Kimball, the lumber man, to be used on a lumber coasting vessel, believed to be the largest gasoline engine ever built on the coast. They built a fifty-horse-power engine for Mr. Kimball last year.

—The Redlands Electric Light and Power Company are investigating the merits of a new electric car system of which a sample is in operation in New York. The system does away with the trolley, the current being carried through a metal strip in the center of the track. By a system of switches, none of the strip is charged with electricity at any time except that directly beneath the car.

—Major Post has taken charge of the fight to save the Cascade locks, on the Middle Columbia river, the Government standing the expense. Six trains are running, hauling brush, gravel, rock and anything that can be utilized to raise the bulkhead. Some of the cut stones are being dumped into the works, and seventy barrels of cement were used in one day in solidifying the sand and gravel.

—Talking of the much-discussed San Joaquin Valley Railroad, Traffic Manager Leeds says: "I have found no difficulty in interesting people in behalf of a scheme appeals to the financial interests of all. The cost of the road will not be over \$10,000 a mile. The matter is being considered daily in the executive committee of the association, but no steps have been taken so far to incorporate a company. This will be done shortly."

—Plans are being perfected for the reclamation by the State of nearly 1,000,000 acres of swamp and overflow lands on the Sacramento, Feather and San Joaquin rivers and their tributaries. Nearly \$15,000,000 has heretofore been almost wholly wasted in a similar effort. The plan in general will be to utilize the waterflow for dredging and create a system of reservoirs. The matter will be embodied in an engineer's report to the Legislature.

—The local market is unusually bare of Australian gas and steam coal, and cargoes to arrive are quoted at full figures. The business at the Tacoma coal mines is reported good at the present time, considering the general depression of trade. The Carbonado mines, which ship their product to the Southern Pacific Railroad Company here, send 30,000 tons monthly. The Wilkeson mines produce from 11,000 to 12,000 tons monthly, and convert a large amount into coke in their ovens at the mines.

—The result of the recent test of Washington coal made by the several vessels of the Behring Sea fleet is waited for with considerable interest. For years every effort has been put forth to induce the naval authorities to buy American coal instead of the coal from the British Columbia mines. The contract for this year's supply was made as usual with the Comox mine on Vancouver Island, but Secretary Herbert afterward ordered the Behring Sea fleet to visit Puget Sound and make a thorough trial of the steaming qualities of the Washington product.

—The Pacific Steam Whaling Company's steamer Jennie has started for Herschel Island, in the Arctic Ocean, with a cargo of supplies for relief stations that have been established for distressed whalers and sealers and stores for the crews of the whalers that will go into winter quarters at Herschel Island when the ice begins to pack. Among the cargo are 150 cases of coal oil, 700 tons of coal, 530 barrels of beef, pork, fish, etc., 837 cases of canned meat, fruit and vegetables, 10,000 pounds of beans, 11,000 pounds of bread, 17 barrels of beer, 1100 pounds of dried fruit, 5500 pounds of coffee, 350 barrels of flour, 15,000 pounds of sugar, 49 barrels of molasses, 3 barrels of rum, 7 cases of whiskey and 2000 pounds of tobacco. She carries 4 whaleboats, 25 cases of rifles and 25,000 cartridges.

Patents Issued to Pacific Coast Inventors.

Reported by Dewey & Co., Pioneer Patent Solicitors for Pacific Coast, 220 Market Street.

FOR WEEK ENDING JUNE 6, 1894.

521,072.—WATER CLOSET PUMP.—E. D. Andrus, Seattle, Wash.
520,877.—SULKY BRAKE.—Clawson & McKerron, S. F.
621,106.—SLUICE VALVE.—W. A. Doble, S. F.
520,964.—METALLIC PACKING.—C. H. Ensign, Kekaha, H. I.
521,141.—FRUIT CARRIER.—T. S. Fitch, S. F.
520,880.—TURB—Gwynn & Spencer, Napa, Cal.
520,937.—BILLIARD COUNTER.—W. S. Hannaford, Pasadena, Cal.
520,782.—ELECTRIC MOTOR.—A. Himman, Olympia, Wash.
520,928.—CAR COUPLING.—Geo. Ker, Portland, Or.
520,932.—FLOW.—H. B. Martin, Chicago, Cal.
520,934.—SULKY FLOW AXLE.—W. B. Morrie, Collinsville, Cal.
520,858.—MOTOR.—E. I. Nichols, S. F.
520,829.—DISH CLEANER.—C. Palmleaf, Seattle, Wash.
520,933.—CONCENTRATOR.—A. H. Rapp, S. F.
521,069.—CLUTCH.—T. J. Thorp, Forest Grove, Or.
52,385.—SCALE BRAM DESIGN.—J. E. Withrow, Los Angeles, Cal.

NOTE.—Copies of U. S. and Foreign patents furnished by Dewey & Co. in the shortest time possible by mail or telegraphic order. American and Foreign patents obtained, and general patent business for Pacific Coast Inventors transacted with perfect security, at reasonable rates, and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

AUTOMATIC UNCOUPLER AND CAR BRAKE.—Joseph P. Dias, S. F. No. 520,204. Dated May 22, 1894. This invention relates to an attachment for cars which is designed to automatically uncouple the cars when any accident happens by which the car in front becomes derailed or thrown down, and to simultaneously apply a brake to the cars remaining upon the track. It consists of a device adapted to be operated by a downward pull of the forward car; a longitudinally-moving head, connected with a coupling link so as to be drawn forward with it when the cars are separated; a brake shoe suspended in front of the car wheels, with a supplemental grip shoe slidable on it and adapted to move down upon the point between the wheel and the track; a bell crank lever and a connection between which and the movable shoe and a rod connecting the bell crank lever with the movable part of the coupling. There is a stationary pin upon the car, and a spring which retains the link in place when it is connected with the pin, this spring yielding to allow the link to be tilted downward and disengaged. There is also a pawl and ratchet mechanism by which the bar is retained in the advanced position after it has been drawn forward and the disengaging piece which allows the coupling chain and link to be dragged away if the front car is disengaged without disturbing the othercar.

ELECTRIC ADVERTISING OR SIGNALING APPARATUS.—No. 520,223. May 22, 1894. George L. Schneider, San Francisco, Cal., assignor of seven-eighths to Wm. J. Pattosien, Fred L. Waibel, Charles Fisher, George Brandt, Gus A. Paul, Fred Brandt and A. R. Paul of San Francisco. This invention relates to the class of devices adapted to electrically produce visible signals. It consists of a mat or frame of electric lights, a correspondingly arranged series of contacts with electrical connections with such lights, a series of push buttons adapted to make and break electrical connection with said contact, and suitable electric circuits including these parts. The series of contacts may be remote from the mat or frame containing the lights, and is electrically connected with the lights, and these contacts correspond in number and relative position with the positions of the lights, so that a metal plate fitted over the contacts with a series of spring-actuated push buttons in the plate, normally out of electrical connection with the contacts, is adapted to make and break the connection. A single circuit wire includes the plate, button, contact and lights in its circuit.

STEP LADDER.—Julius E. Chittenden, Niles, Cal. No. 520,202. Dated May 22, 1894. The object of this invention is to provide an improvement in step ladders which allows them to be used in either outdoor or orchard work, and to provide simple adjustments by which the relative position of the feet and supports may be regulated and the width of the base altered to suit the position and height of the ladder. It consists of a main portion composed of sides and steps having a supplemental exterior frame comprising sides converging from points opposite the lower end of the main portion of the ladder and extending to a distance above the upper portion, converging to a point at the upper end. Transverse strips unite the two parts and hold them together, and an expandable base formed of diverging legs serves to increase and regulate the width of the base to suit the surface or position of the ladder. The rear portion of the ladder is supported by a single adjustable leg having sliding parts, means for holding it in any of the various positions in which it may be placed, so that the ladder may be readily adjusted to stand upon any uneven surface.

TRACK OR CARRIER FOR DOORS.—George E. Witt, Fresno, Cal. No. 520,199. Dated May 22, 1894. This invention relates to a device for suspending sliding or travelling doors or carriers and for other similar purposes. The object of the invention is to provide a device for suspending any traveler which is intended to run from one point to another. It is applicable to the suspension of car and other sliding doors, also for transporting hay in barns and for other similar purposes. It consists of a suspended traveler having hangers provided with rollers, a tube having its lower surface slotted to admit the hangers so that the rollers travel within the tube, and the tube itself is journaled so that it may turn about its longitudinal axis, so that if desired the doors may be turned up and supported in an

approximately horizontal position to form an awning. The hangers have openings of sufficient diameter to allow the rollers to be introduced from the side, and a slot connecting with the upper part of this opening serves to receive the axis which extends between the rollers, the rollers being separated a width equal to the thickness of the hanger. One of the supporting brackets is also slotted to correspond with the slot in the tube, and by removing an end cap upon the tube, the hangers may be moved out through the slot in the bracket so as to be entirely removed from the tube, the door thus being taken off or replaced at will.

CONCENTRATOR.—A. H. Rapp, San Francisco, Cal. No. 520,939. Dated June 5, 1894. This invention is intended to provide an improvement to apparatus for the separation of valuable or heavy material from the lighter sands, earth and tailings with which it is mixed. These substances are very difficult to separate, and it is the object of this invention to assist in the separation. It consists of a sluice having transversely movable agitating plates, the lower portions of which dip into the passing current and are twisted so as to present flat surfaces to obstruct the flow of the current. It also consists to means for reciprocating these plates horizontally, a means for varying the angle or position of the plates, and in conjunction with this device of transverse rifles across the bottom of the sluice having under cuts and intermediate pockets into which the heavier material will settle and lie out of the path of the current flowing through the sluice.

SULKY BRAKE.—Leonard E. Clawson and J. A. McKerrow, San Francisco, Cal. No. 520,877. Dated June 5, 1894. The object of this invention is to provide an automatically operating attachment whereby the wheels of sulky or other two-wheeled vehicle may be instantly locked whenever the horse attempts to rear, and thus to prevent the vehicle from running under the horse and throwing him over backward. It consists of an arm connected with the vehicle at a point eccentric to the wheel center, extending downwardly so that it will stand normally out of contact with the ground, and a lever upon the lower portion of said arm provided with a brake surface adapted to be thrown into contact with the wheel when the frame is raised to force the lever into contact with the ground.

338; fractional silver coin, \$17,582,973; silver bullion, \$127,231,644. On May 31, '93, the total was \$29,160,279 less than on the 31st ult.

Mining Companies' May, '94, Dividends.

Company	May	Total for year
Alaska-Treadwell	\$75,000	21,658
American	25,000	75,000
Bald Butte	\$25,000	25,000
Belden Mica	5,000	500,000
Bureau	25,000	25,000
Bullion B. & C.	15,000	15,000
Central Eureka	500,000	500,000
Cal. & Hecla	3,400	17,000
Champion	50,000	100,000
Copper Queen Co.	200,000	32,813
De Lamar	6,000	30,000
Elkhorn	80,000	60,000
Elkton	12,000	60,000
Franklin	5,000	25,000
Goode Fleece	5,000	5,000
Goode Reward	36,000	15,000
Golden Rule	10,000	15,000
Harqua Hala	18,750	87,500
Helena & Frisco	25,000	25,000
Highland	50,000	20,000
Homestake	48,000	240,000
Hope	10,000	50,000
Horn Silver	25,000	125,000
Iroo Mountain	9,600	38,400
Kenoedy	20,000	20,000
Mayflower Gravel	12,000	24,000
Mercur	20,000	20,000
Morning Star Drift	3,600	18,000
Moutoo	200,000	200,000
Moore	25,000	125,000
Napa Con.	10,000	20,000
Omaha	2,500	12,500
Quincy	6,250	6,250
Rico-Aspen	3,000	15,000
Smuggler		
Standard Co.		
Trinity River Hydraulic		
Union		
Victor		
W. Y. O. D.		

Totals.....\$885,100 \$3,279,121
Nineteen mines paid dividends in April, amounting to \$393,350.

San Francisco Metal and Coal Market.

ANTIMONY.	QUICKSILVER.
Per lb. @ 12	Home trade, pr. @ 35
Refined, in car lots @ 71	flask @ 35 75
Powdered, do. @ 71	STEEL
Concentrated, do. @ 71	English, do. @ 20
COPPER.	Oanton tool @ 84
Bolt @ 28	Bl'k Diam'd tool @ 15
Sheeting @ 23	Pick & Hammer @ 10
Ingots, 10 lbs. @ 20	Machinery @ 5
Do, wholesale @ 15	Too Oalk @ 41
IRON.	FIG TIN.
Bar, base @ 24	Spot @ 22 1/2 @ 22
Norway, base @ 41	SPOT FROM YARD—PER TON.
PIG IRON.	Wellington @ 7 50
Eglington @ 23 50	Greta @ 6 25
Glengrue @ 22 50	Nanaimo @ 5 75
Am. Best No. 1 @ 22 50	Gilman @ 7 00
Shot No. 1 @ 22 50	Seattle @ 6 00
Puget Sound @ 22 50	Ocos Bay @ 6 00
Olay Lane White @ 22 50	Channel @ 8 75
Walden @ 22 50	Egg, hard @ 12 00
Gartshore @ 22 50	Wash @ 7 00
Sarrow @ 22 50	Scotch 8 pin @ 7 75
Oargoeft @ 22 50	Brynna @ 7 25
	West Hartley @ 7 25
	TO LOAD—PER TON.
	Australian @ 6 50
	Liverpool Steam @ 7 00
	Scotch Spill @ 7 50
	Cardiff @ 7 50
	Lehigh Lump @ 17 00
	Cumberland @ 9 00
	Egg, hard @ 10 00
	West Hartley @ 9 25
	Coke.
	2 10 English, to load @ 39 00 @ 9 50
	Do, spot, in bulk @ 61 50
	Do, in sacks @ 61 50
	Cumberland @ 9 00 @ 2 50

Lead.

Fig. @ 4	4
Bar @ 4	4
Sheet @ 4	4
Pipe @ 4 75	4 75
Drop, sizes smaller than 3/4 bag of 25 lbs. @ 1 95	1 95
Do, do, 3/4 bag of 25 lbs. @ 2 10	2 10
Buck, Balls and Chilled @ 2 10	2 10
dn, 3/4 bag of 25 lbs. @ 2 10	2 10

Mining Share Market.

It has been a dull week in the mining share market. The exchanges will have a holiday from June 29 to July 5. The decline in the early part of the week was not followed by a very active movement, and the aggregate of sales was small. The following illustrates the changes of the week:

MINES.	7	14
Utah	\$ 6	81 85
Sierra Nevada	68	67
Union	1 05	1 10
Mexican	2 65	2 80
Ophir	4 15	4 65
Consolidated California and Virginia	1 50	1 55
Best & Belcher	92	1 05
Gould & Curry	79	75
Hale & Norcross	69	60
Chollar	41	41
Potosi	65	58
Bullion	21	22
Excelsior	3	10
Confidence	14	16
Alpha	58	58
Yellow Jack	78	70
Crown Point	88	87
Belcher	21	21
Overman	15	15
Justice	15	15
Alta Consolidated	15	26
Consolidated New York	2	8
Challenge	38	37
Bodie	1 00	91
Andes	50	62

There is announced a total in June on mine assessments of \$167,480. Of this amount, Storey Co., Nev., represents \$120,230; three counties in Cal., Inyo, Nevada and Mono, call for \$27,250, and Pinal county in Arizona, \$20,000. Completeness is not claimed for this or any similar summary, but as in other summaries it is full so far as the publicity given to the details from which it is gathered make it possible.

LOANS AND MINES

Loans negotiated on first-class securities. Mines and mining prospects of guaranteed value sold on working bonds. C. H. DWINELLE, Grand Hotel, San Francisco, Cal.

MINING SHAREHOLDERS' DIRECTORY.

COMPILED EVERY THURSDAY FROM ADVERTISEMENTS IN THE MINING AND SCIENTIFIC PRESS AND OTHER S. F. JOURNALS

COMPANY AND LOCATION.	NO. AMT. LEVIED, DELINQ. T. & SALE.	SECRETARY.
A. & M. Co., California	15 25 May 3, June 11, July 2	F. M. Husted, 530 California
Alta M. Co., Nev.	48 100 April 30, June 19, July 10	J. E. Jacobus, 309 Montgomery
Best & Belcher M. Co., Nevada	58 250 April 30, June 19, July 10	L. O. Horn, 309 Montgomery
Bulwer Cons. M. Co., Cal.	9 100 May 24, June 23, July 27	L. O. Horn, 309 Montgomery
Con New York M. Co., Nev.	12 50 May 11, June 19, July 12	C. K. Elliott, 309 Montgomery
Cons. St. Gotthard M. Co., Cal.	9 60 May 17, June 21, July 9	J. F. Holling, 113 Crocker Bldg
Crow Point C. & S. M. Co., Nev.	61 250 April 23, May 28, June 18	Jas. Newlands, Mills Building
Golden Prize M. Co., Nevada	6 250 April 23, May 28, June 18	C. D. Bennett
Hale & Norcross M. Co., Cal.	36 36 May 11, June 19, July 12	C. K. Elliott, 309 Montgomery
Olay Eagle M. Co., Cal.	105 250 May 1, June 5, June 28	A. B. Thompson, 309 Montgomery
Overman M. Co., Nevada	2 250 April 23, May 28, June 18	C. E. Kelly, 213 Sansome
Hazard G. M. Co., California	3 100 May 3, June 11, July 3	Aug. Waterman, 309 Montgomery
Kentuck Cons. M. Co., Cal.	50 250 June 12, July 17, Aug 7	O. E. Elliott, 79 Nevada Block
Mexican C. & S. M. Co., Nev.	16 100 May 31, June 5, July 31	A. K. Durrow, 69 Nevada Block
Ophir M. Co., Nevada	62 250 May 4, June 6, June 26	E. B. Holmes, 309 Montgomery
Silver King M. Co., Arizona	10 250 May 2, June 11, July 9	J. W. Pew, 310 Pine
S. Eureka M. Co., California	11 100 May 15, June 25, July 10	A. Halsey, 328 Montgomery

COMPANY AND LOCATION.	MEETING.	SECRETARY AND OFFICE IN S. F.	DATE.
Alaska-Treadwell G. M. Co., Alaska	Annual	A. T. Corbin, Mills Building	June 20
Bodie Cons. M. Co.	Annual	M. E. Willis, 309 Montgomery	June 18

For the South African Gold Fields!

THERE WILL BE DISPATCHED ABOUT JULY 1, 1894, Providing sufficient passengers offer, the superior, large and commodious iron steamer, SANTA CLARA, FOR CAPETOWN DIRECT.

Gold and Silver Miners and Mechanics preferred.
FIRST-CLASS PASSAGE TO CAPETOWN.....\$200
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A large number having already engaged passage, early application to secure tickets is requisite. A competent Surgeon will be aboard. For information apply to

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DYNAMITE AND POWDER CO.

MANUFACTURERS OF

DYNAMITE AND BLASTING POWDERS.

18 CALIFORNIA STREET, SAN FRANCISCO.

Directors:

C. S. BENEDICT, ALVINZA HAYWARD, JOS. KNOWLAND, JOHN S. DOE, ED. G. LUKENS (President)

Board Sales of Mining Stocks.

S. F. Stock Board.

THURSDAY, June 14, 1894.

9:30 A. M. SESSION.	
700 Alpha	15c 300 C. C. & Va. 4.55
100 Alta	26c 300 Con New York 3c
200 Andes	62c 300 G. & C. 1.05
200 Belcher	37c 100 H. & N. 75c
200 Bodie	11c 100 Iowa 7c
50 Best & Belcher	1.65 350 Mexican 1.10
200 Bullion	22c 100 Overman 1.30
200 Butcher	8c 100 Ophir 1.05
100 Caladenia	15c 100 Potosi 1.05
100 Chollar	15c 300 Sierra Nevada 35c
2:30 P. M. SESSION.	
300 Alpha	13c 100 Eschschuer 10c
150 Alta	21c 100 G. & C. 97c
150 Andes	22c 300 H. & N. 71c
100 Andes	57c 50 Iowa 7c
100 Belcher	38c 100 Ophir 2.55
100 B. & B.	1.40 100 Overman 1.30
300 Bodie	90c 100 Potosi 1.05
220 400	91c 100 Potosi 1.05
100 Bulwer	56c 100 Potosi 1.05
100 Challenge	15c 150 Savage 60c
100 Chollar	35c 500 Sgt. Belcher 6c
250	36c 100 Sierra Nevada 80c
220 Con. Cal. & Va.	4.30 200 Union 57c
100 Crown Point	70c

Assessment Notices.

OCCIDENTAL CON. MINING COMPANY—LOCATION of principal place of business, San Francisco, California; location of works, Silver Star Mining District, Storey County, Nevada.
Notice is hereby given that at a meeting of the Board of Trustees, held on the thirty-first day of May, 1894, an assessment (No. 18) of Ten Cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the Secretary, at the office of the Company, Room 69, Nevada Block, No. 309 Montgomery Street, San Francisco, California.
Any stock upon which this assessment shall remain unpaid on the fifth day of July, 1894, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the thirty-first day of July, 1894, to pay the delinquent assessment, together with the costs of advertising and expenses of sale. By order of the Board of Trustees.
ALFRED K. DUBROW, Secretary.
Office—Room 69, Nevada Block, No. 309 Montgomery Street, San Francisco, California.

Cal. Debris Commission Notices.

THE CALIFORNIA DEBRIS COMMISSION having received applications to mine by the hydraulic process from L. V. Pettit in the Concordia mine, near Cromberg, Plumas County, to deposit tailings behind dams in Osgood Ravine and Jackson Creek; from the Northern Placer Mining Company in their mine near Cromberg, Plumas County, to deposit tailings behind brush dams in Little Long Vale Creek; and from Thomas White in the Schuyler mine, near Igou, Shasta County, to deposit tailings behind dams in Dr Creek, give notice that a meeting will be held at Room No. 92, Flood Building, San Francisco, Cal., on June 26th, 1894, at 1:30 P. M.

THE RUSSELL PROCESS.

For information concerning this process for the reduction of Ores containing precious metals, and terms of license, apply to
THE RUSSELL PROCESS CO.,
Park City, Utah.

Market Reports.

The Markets.

SAN FRANCISCO, June 14, 1894.

After a few fluctuations the price of silver closed the same as for the corresponding period of last week. The see-saw since Jan. 1 leaves little difference to note. The highest reached in January was 31 3/4 d in London; 69 cents in New York; the lowest was in May, 28 d in London, 61 cents in New York. During the first five months of 1893 the highest was 38 3/4 d in London, 84 1/2 cents in New York; the lowest, 37 1/4 d in London, 81 1/2 cents in New York.

A good investment for big sums would seem to be the purchase of silver at present prices. It is sure to appreciate, with resultant effect upon large purchasers, making them rich beyond the dream of avarice.

New York Prices.

NEW YORK, June 14.—Following are the closing prices for the week:

Silver in—	Copper.	Lead.	Tin.
Thursday.....28 3/4	62 1/2	9 25	3 20 19 50
Friday.....28 3/4	62 1/2	9 45	3 20 19 50
Saturday.....28 3/4	62 1/2	9 45	3 20 19 50
Monday.....28 3/4	62 1/2	9 40	3 20 19 50
Tuesday.....28 3/4	62 1/2	9 40	3 20 19 50
Wednesday.....28 3/4	62 1/2	9 40	3 20 19 50

The local bullion, money and exchange quotations current are as follows:

Commercial Loans, per cent per annum.....	7 @ 8
Commercial Loans, prime.....	6 @ 8
Call Loans, gilt-edged.....	7 @ 8
Call Loans, mixed securities.....	7 @ 8
Mortgages, prime, taxes paid by lender.....	7
New York Sight Draft.....	12 1/2 c
New York Telegraphic Transfer.....	15c
London Bankers', 60 days.....	\$4.88
London Merchants.....	\$4.86 1/2
London Sight Bankers'.....	\$4.84 1/2
Refined Silver, per ounce.....	62 1/2
Mexican Dollars, nominal.....	50 1/2 @ 51 1/2

Quicksilver.

The monthly receipts of quicksilver at this port, as reported in the Bulletin, have been as follows:

Flasks—	1894.	1893.
January.....	3,247	2,243
February.....	2,359	2,388
March.....	2,386	1,588
April.....	2,291	1,623
May.....	2,216	2,511

Five months.....12,479 10,353

Increase in 1894.....2,126

The total for the first five months of 1892 was 8618 flasks, against 5689 in 1891 and 5254 in 1890.

The exports by sea in the past month were as follows:

To—	Flasks.	Value.
Mexico.....	630	\$18,399
Central America.....	100	3,150
New York.....	500	15,000

Totals.....	1,230	\$36,549
January.....	1,331	40,042
February.....	2,580	71,431
March.....	1,855	54,499
April.....	1,321	44,424

Five months.....8,317 \$246,855

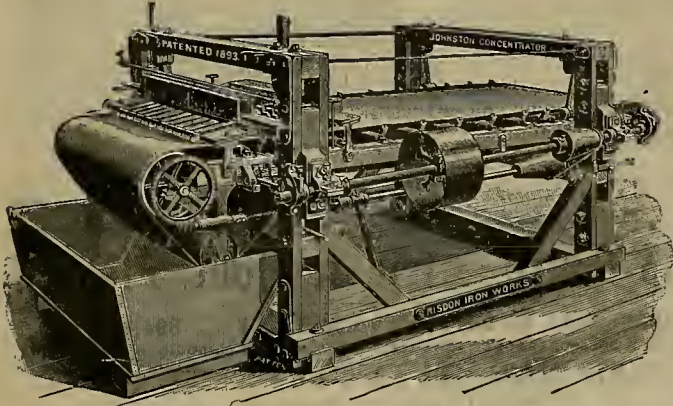
Against 8021 flasks for the first five months of 1893

4302 in 1892, and 1581 in 1891.

United States Treasurer Morgan reports that on May 31st he had on hand in Government vaults \$783,283,264. Of this \$660,262,771 was in specie. The specie consisted of gold coin, \$100,000,180; gold bullion, \$48,067,705; silver dollars, \$367,330;

The Johnston Concentrator.

SIMPLICITY OF CONSTRUCTION. GREAT DURABILITY. EASE OF OPERATION. INCREASED PERCENTAGE OF SULPHURETS SAVED.



THE JOHNSTON CONCENTRATOR.

(EXTRACT)

RISDON IRON WORKS:—The machine has the same monotonous record, i. e., they absolutely ship two more as soon as possible.

(COPY)

THE RISDON IRON AND LOCOMOTIVE WORKS, San Francisco—GENTLEMEN: We have tested the Johnston Concentrator furnished us by you on trial; and after an exhaustive test, we are satisfied it is the best in the market. Please prepare and ship us—as soon as possible—THIRTEEN more machines.

{ GOLD BLUFF MINE, DOWNVILLE, CAL., Jan. 24, 1894. W. KRAFT, Superintendent. Respectfully,

SAN FRANCISCO, CAL., June 1, 1894.

Yours truly, APOLLO CONS. MINING CO. By LEON SLOSS.

MANUFACTURED BY

THE RISDON IRON WORKS,

OFFICE AND WORKS:

Cor. BEALE and HOWARD STREETS,

SAN FRANCISCO, CAL.

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CATALOGUES AND PRICES FURNISHED UPON APPLICATION.

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ADAPTED TO EVERY DESCRIPTION OF MINING AND MILLING

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213 FIRST ST., SAN FRANCISCO, CAL.

THE MCGLEW ORE CONCENTRATOR COMPANY.

{ PATENTED
Sept. 19, 1893. }

CHEAPEST, SIMPLEST, MOST DURABLE AND CLOSEST SAVING CONCENTRATOR IN USE.

{ FRANK BARRERE,
Secretary and Manager. }

CAN BE SEEN IN OPERATION AT THE COMPANY'S WORKS, 180 MAIN STREET, SAN FRANCISCO.....OFFICE, 116 DAVIS STREET

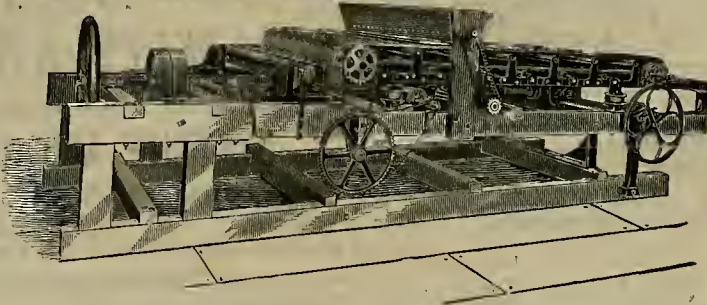
NINETY-FOUR AND ONE-HALF PER CENT

—SAVED—

ON ORES DIFFICULT TO CONCENTRATE.

A MARVEL of Simplicity, Durability and Effectiveness, combining both Side and End Motion with a Bumping Belt. SPEED AND INCLINE of belt and amount of PERCUSSION easily and quickly regulated, WHILST IN OPERATION. CAPACITY about ten tons. Only one-tenth horse power required. Adapted for either canvas or rubber belts.

PRICE.....\$350 EACH,
Including Four-Foot Prepared Canvas Belt.



FALLS MINE, IGO, SHASTA CO., CAL., May 25th, 1893.

THE MCGLEW ORE CONCENTRATOR COMPANY: I take much pleasure in endorsing your very superior Ore Concentrator. When I was requested to examine your concentrator, I did so under protest, declaring that I would have none other than a Frue, as after many years experience with different concentrators, I believed them to be the best.

Now, after a thorough trial of the McGlew Ore Concentrator, on ore difficult of concentration, I emphatically pronounce it the best concentrator of any I have ever used in handling my ores. It is doing OLEANER and CLOSER work than I had believed possible for any concentrator to accomplish.

Samples of pulp and tailings, taken every hour, dried, mixed and assayed, show * * * from West ledge, a saving by your concentrator of 94 per cent; from East ledge, * * * a saving of 92 per cent.

The concentrator runs very easy and requires but slight attention. One man attends to rock-breaker, crusher and concentrator. You have a good concentrator, and it can be relied upon to handle any ore that will concentrate. I most heartily recommend it to the mining public. Yours respectfully,
E. L. BALLOU, Propr. Ballou Reduction Works.

IF YOU ARE DRILLING ROCK

— WITHOUT —

INGERSOLL-SARGEANT LATEST IMPROVED DRILLS and COMPRESSORS

YOU ARE LOSING MONEY.

— WRITE FOR CATALOGUE TO —

PARKE & LACY CO., SOLE AGENTS FOR THE PACIFIC COAST,
21 & 23 FREMONT ST. SAN FRANCISCO, CAL.

THE PELTON WATER WHEEL!

EMBRACING IN ITS VARIATIONS OF CONSTRUCTION AND APPLICATION

THE PELTON SYSTEM OF POWER.

The most simple and efficient water power appliance for mining, electric or other service. Full and reliable information given regarding any proposed application upon receipt of the necessary data.

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MINING AND SCIENTIFIC PRESS.

AND PACIFIC ELECTRICAL REVIEW.

An Illustrated Journal of Mining, Mechanics and Popular Science.

VOLUME LXVIII.
Number 25.

SAN FRANCISCO, SATURDAY, JUNE 23, 1894.

Three Dollars per Annum.
SINGLE COPIES, 10 CENTS.

Universal Milling Machine.

Herewith is illustrated a universal milling machine, the table of which can be swiveled to any angle.

The feed has four changes, and is tripped automatically, or by hand, under full cut, as easily as when the table is running light. A full range of spirals, right and left hand, can be cut from one turn in one inch to one turn in 100 inches, by both simple and compound gearing. For every-day practice, the range of simple-gearled spirals is amply sufficient, and the gears are as readily changed as on an ordinary screw-cutting lathe.

The spindle is of forged crucible steel, hollow its entire length, and the front end threaded, and hole tapered, so that arbors and chucks, fitting spiral head, will interchange with main spindle.

The spiral head is new in design, and so arranged that the elevation of its spindle to or near the vertical position raises the work as little as possible above the platen, and the arc through which it can be rotated in a vertical plane is 210°. It can be used on either end of the table.

The spindle of the spiral head is also hollow, pieces fifteen-sixteenths inch diameter passing clear through it.

The cone pulley has its smallest step toward the front, which permits the top of the column to slope upward toward the front-spindle bearing, bracing it and securing rigidity. The two spindle bearings are tied together by an arch at the top, which also supports the overhanging arm. A bearing nine inches long is bored in the arch, slotted at the top, and provided with two clamping screws. The arm can be quickly inserted, clamped fast, and as quickly removed.

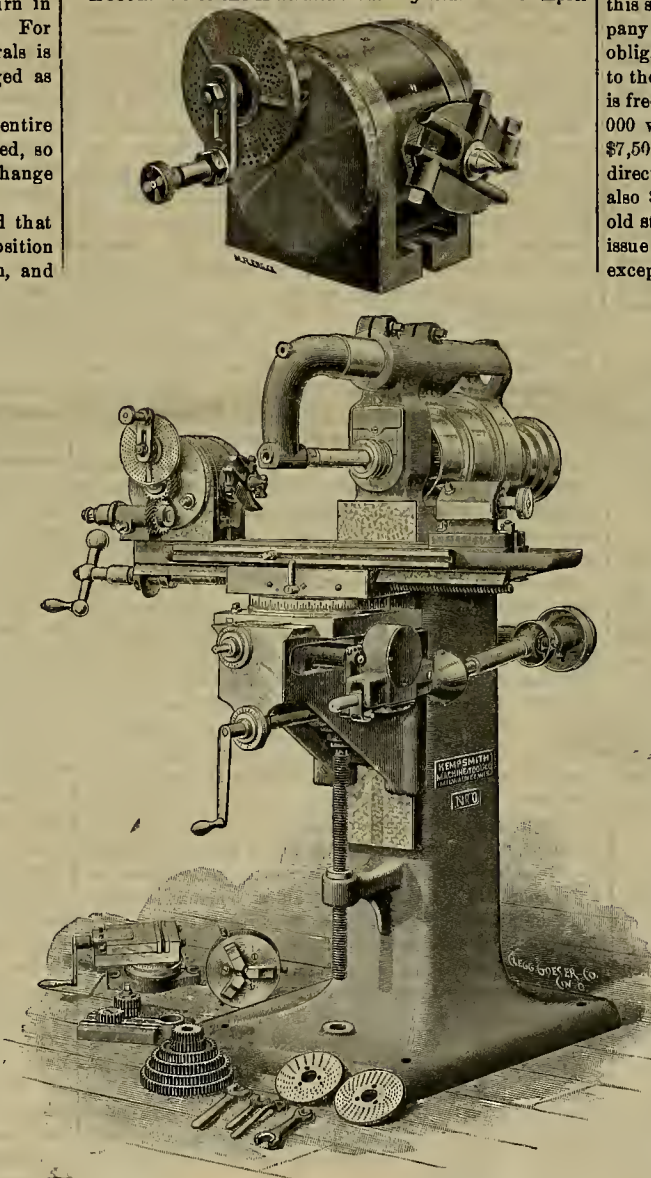
The spindle boxes are of bronze, made in halves. They are cylindrical in form, with a deep rib running around the middle, faced square with the turned surface, and forced into a groove cut into the column and box cap. The outside of the box is finished entirely in the lathe, which makes its reproduction, when worn out, a simple matter.

The vertical adjustment of the knee is 14½ inches; in-and-out movement of platen (in line with spindle), 4½ inches; automatic feed, 18 inches; length of platen, including oil-pan, 33 inches; diameter of work taken on centers, 8½ inches; length between centers, 14 inches; size of front spindle bearing, 2 inches by 3½ inches; weight of machine, 1200 pounds. It is made by the Kempsmith Machine Tool Co., Milwaukee, Wis.

OF the collapse of the recent strike in the bituminous coal regions the *Coal Trade Journal* says: "The farce has been played, the tragedy has spent its force and the curtain has fallen. The chief actors have received their remuneration, even if the subordinates have not. As the net result of six weeks' idleness, certain of the coal-owners have made a million of dollars upon the stock on hand at the lake ports, as well as at those points on the Ohio where large stocks had accumulated. It was not anticipated when the strike was called that there would be so long a period of idleness, but the stocks in hand were larger than at first supposed to be the case. In certain districts the men get a few cents more than the rate which had been explicitly agreed upon previous to the unwarrantable calling out; their employers in the main can afford, temporarily at least, to give this, for not a few of them have been the gainers from the conditions existing in the past

six weeks. Other places have not been so fortunate (if this term may be used at all), for they have had to resume at old wages, after a loss of time that it will take years of steady work to recover; they have been duped, and, through the sympathy idea, have helped some one to pull the chestnuts out of the fire."

ACCORDING to the *Australian Mining Standard* of April



THE UNIVERSAL MILLING MACHINE.

28th, primary instruction would seem requisite in the case cited "where the English directors of a South African mine, in reply to their manager, who wrote to say that a new shaft was necessary, which he estimated would cost £500, said they thought the price was exorbitant, and enquired if he could not buy a second-hand one at a less figure!"

BUSINESS does not seem to improve as rapidly as was hoped. In general it would seem that what is most needed is confidence. Last year's scare is still in the air, and with unequalled resources industries languish. Confidence is a plant of slow growth, and easily uprooted.

The Nicaragua Canal.

The most important public work in reference to Coast industries is the Nicaragua canal. A bill for its construction is being drafted by the House Committee on Interstate and Foreign Commerce. It is thought in and out of Congress that the bill can pass both houses of Congress this session. Briefly, the bill provides that the old company shall call in and cancel all its stock, all outstanding obligations and contracts, all its debts, and when it shows to the satisfaction of the Secretary of the Treasury that it is free from all obligations he shall subscribe for \$70,000,000 worth of stock and call in all stock except the \$7,500,000 worth held by Nicaragua and Costa Rica. The directors shall issue that stock to the United States and also \$1,000,000 to such person as may be selected by the old stockholders as a bonus, and the company shall then issue no more stock. The terms of the present directors, except the two representing Nicaragua and Costa Rica, shall terminate, and the old stockholders shall name one director and the President of the United States shall name twelve, which shall constitute the board of directors. This number may be cut down to eight before the bill leaves the committee. Not more than one-half of the board shall be members of the same political party. The regular term of these directors shall be six years.

An accounting will be had with the old stockholders as to the amount they have expended, and when this claim is proved to the satisfaction of the Secretary of the Treasury stock equal to this amount shall be issued to them. This stock shall be non-assessable, and the Government reserves the option of buying it at any time by paying not to exceed its par value.

No dividend shall be declared on the stock except on the net earnings, and then it shall not exceed 4 per cent. The salary of the board of directors is fixed at \$4000 a year. The President, on the suggestion of the chief of engineers, shall detail three army officers from the United States Engineer Corps, one of whom shall be chief engineer in charge of the construction of the canal. He may detail such additional engineers as may be needed by the company in the transaction of its business. The intention is to have the bill provide for United States engineers making an estimate of the cost of construction of the canal in sections. The work shall then be done substantially, as river and harbor work is done here, except that it will be a continuous contract system.

It is the intention to have work begin at both ends of the canal at once. The bill will provide for the issuance of \$70,000,000 in bonds, to be disposed of as the work progresses, thus insuring means for the completion of the enterprise under this bill. The total capital stock of the company

will be \$83,000,000; \$7,500,000 will be held by Nicaragua and Costa Rica, \$70,000,000 by the United States, and the balance of the amount shown to have been expended by the old stockholders.

THE report of the directors of the Montana Mining Company shows that during the six months ending January 1, 1894, 32,553 tons of ore were reduced in the mills which yielded in bullion and concentrates an average of \$9.98 per ton, or \$324,726. The gross yield was 9728 ounces of gold and 95,855 ounces of silver. The total expenses for the same period were \$251,351, leaving a net profit of \$5494 for the half-year.

MINING AND SCIENTIFIC PRESS.

Office, 220 Market Street, Northeast corner Front, San Francisco.
 Take the Elevator, No. 12 Front St.

Terms of Subscription.

Annual Subscription, \$3. New subscriptions will be declined without cash in advance. All arrears must be paid for at the rate of \$3.50 per annum.

Advertising Rates.

	1 week.	1 month.	3 mos.	12 mos.
Per line (agate).....	\$ 25	\$ 50	\$ 1.20	\$ 4.00
Half inch (1 square).....	1.00	2.50	6.50	22.00
One inch.....	1.50	6.00	13.00	42.00

MINING NOTICES.

Assessment Notices.....\$10.00
 Delinquent Notices, per square..... 3.00
 Large advertisements at favorable rates. Special or reading notices, legal advertisements, notices appearing in extraordinary type or in particular parts of the paper, at special rates. Four insertions are rated in a month.

Entered at the E. F. Postoffice as Second-Class Mail Matter.

Our latest forms go to press on Thursday evening.

San Francisco, June 23, 1894.

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If the Governor of Colorado were to take to heart all the hard but well-deserved things the Colorado press say about him he would resign. He seems to be universally despised for his action, or inaction, in the recent mining difficulty at Cripple Creek.

A RECENT number of the *Popular Science Monthly* has an article alleged to have been written by "a scientific man," in which, as the twilight of evening ensued, "the crescent moon arose out of the waves in the East." A crescent moon rising in the East is so rare a phenomenon that the "scientific man" should vouchsafe further information regarding it.

THE twenty-second plank of the Republican State platform, adopted at Sacramento last Wednesday, favors the "free and unlimited coinage of silver at the ratio of 16 to 1." What is usually understood to be meant by "the ratio of 16 to 1," is this: The legal silver dollar contains 412.5 gr. standard silver, the legal gold dollar 25.8 gr. standard gold. Both are nine-tenths pure, one-tenth alloy. The gold dollar contains 23.22 gr. of pure gold, and the silver dollar 371.25 gr. of pure silver. The latter's weight is sixteen times the former, or, to be more exact, 15.989 times; hence, nominally, sixteen ounces of silver equals one ounce of gold.

THE New York *Financial News* asserts that for the first time in nineteen years India is exporting gold to England. In the course of a week or two the Bank of England will receive \$2,500,000 from that country. Under these circumstances, asks the *Record*, what becomes of the law which the goldites consider so inevitable, that the inferior metal necessarily drives out the superior? For nineteen years, while India was on a silver basis, there was no exemplification of this driving-out law, but just as soon as she is forced on a gold basis the law takes on an entirely new phase. The superior metal begins to drive itself out. How will the goldites explain this? The palpable explanation is that the gold basis policy of England for India was a crafty scheme to enable England to grab as much as possible of the gold of India, which probably amounts to nearly \$1,000,000,000, and to depress India to a still lower level of degradation and poverty. This is the effect which Chancellor Goshen predicted and denounced.

Production of Tinplate in 1893.

The following table, made up from Government reports, shows the total production of tin and terne plate in the United States during 1893 by quarters:

Quarter Ending.	(Tin and Terne Plate— Tin Plate.	Terne Plate.	(Black Plate Used— American.	Foreign.
March 31, 1893.....	15,294,557	14,324,825	11,381,968	78,194,431
June 30, 1893.....	20,748,427	18,705,191	13,354,725	21,279,352
Sept. 30, 1893.....	13,861,163	13,281,317	8,794,027	18,351,453
Dec. 30, 1893.....	14,682,045	12,669,195	15,907,693	11,443,572
Totals, 1893.....	64,586,192	59,070,498	54,337,389	69,268,818

"Risks of Mining."

This is an interjectional part of an article by Mr. F. H. Head in the current number of the *Forum*. Following his statement about the risks of mining to its logical conclusion, the risk is too great for any one to engage in mining, which is a palpable exaggeration. While there are risks in mining, the chances are no greater than in many other lines of business, for as a business proposition is the only way mining can be viewed. Mr. Head says "five-sixths of all the money expended in the effort to produce the precious metals is without return." This is a sweeping assertion, and one that cannot be successfully maintained. While men have lost money in the mining business, where one dollar has been fruitlessly expended one hundred dollars have been flung away in other branches of business. There is "risk" in everything. No line of business is exempt from it. Whether it be the railroad or newspaper; politics or steam transportation; electrical construction, agriculture, manufactures, merchandising, importing, exporting, building, real estate, anything and everything that involves the expenditure of money involves a proportionate risk. The collapse of the great Guion line is a case in point. A dozen years ago that great transatlantic company was putting millions of dollars in such flyers as the "Alaska" and other passenger steamships. They then held the ocean carrying trade, but within the year they have collapsed. The Atlantic is still there; the crowd of passengers is greater than ever; that business, certainly, is not "worked out." Yet Mr. Head would not desire to be understood that there is such "risk" in carrying passengers between America and Europe as to justify the steamship companies in quitting business. The collapse of great businesses all over the country is a matter of daily note. "Risk" was only one element therein. Management had considerable to do with it. A man can fool away money in mining as in other things, but it is believed by the writer that in place of there being too much "risk" in mining to justify the placing of capital therein, there is to-day no business in the United States that shows so small a percentage of failures; no business that offers greater or speedier return for the amount of capital invested than that of mining. If Mr. Head will take a few cold figures from Bradstreet or Dun and supplement them with similar reliable statistics, he will find fewer failures, less stagnation, better reports on invested capital, and in general a healthier tone in the mining industry than in any other. This may seem a good deal to say, but the facts justify the assertion. Even in the present fearful depression, with the world arrayed against three-fourths of the mining interests in the United States, the situation as a whole is less unfavorable than that of any other American industry; the prospects far brighter in the mining industry of the country than in any other branch of general business. When the existing dullness in all lines of business passes away, the mining industry will be first to feel the difference, and there is no branch of business to-day in this country in which capital can more confidently count upon satisfactory return than the mining business.

In no other business to-day is there such demand for the product; in no other business is there such freedom from competition; in no other business is there so wide a market; in no other business is it the rule that the sale is for cash to willing purchasers, and that he who sells is sought, not he who buys, the buyer being the seeker. Mr. Head further says: "Among the countless losses are a few enormous gains, when a genuine bonanza is found, and each producer expects that his turn will come soon. The great fortunes made by four or five Californians in the working out of the great bonanza in the Comstock lode nearly bankrupted the remaining population of the State in their endeavor to go and do likewise. It is like a lottery of which every purchaser of a ticket knows that less one-half the money paid for the tickets is ever refunded in prizes, and that there is not one chance in ten thousand that he will get back his money, yet the possibility of getting a thousand dollars for one is so enticing that lotteries have to be suppressed by law as a menace to the public morals."

In the above he simply confounds mining and gambling in mining stocks. The two are as distinct as wheat raising and dealing in "futures." True, were there no mining there would be no gambling in mining shares; true, also, were there no industrial corporations there would be no dabbling in industrial stocks, but Mr. H. is hardly ready to assume that because a clique can force down Reading or force up N. Y. Central, and "milk the street," that therefore railroad tracks should be taken up and all railroad building stopped.

(In justice to the article it must be said that that portion criticized is only an incidental part of it; with the article itself, "the need of an international monetary agreement," there can be no cavil, and all bimetalists will

agree with the deductions Mr. H. makes. The objection lies solely to that portion quoted, which seems to be unnecessary and out of place in an article of such general manifest value and force.)

Natural Laws Annihilated.

It is a common failing of mankind to rebel at the sphere which fate or Providence has assigned and yearn for another lot. The carpenter thinks if he were only a mason he would lead a happier life; the lawyer wishes he had studied medicine; the comedian feels that tragedy is his true forte; and the tiller of the soil wishes he were a miner and securing store of yellow metal from Nature's treasure house. This is not a new discovery. But there is a cognate principle not so generally understood. While it is true that many men regard themselves as eminently fitted for something better than they are doing, there are others who think themselves at their best in the vocation to which they have been called, but who are really capable of something infinitely better and more useful. There is that eminent Brooklyn divine, for instance, who lectured in this city on the 23th of last month. He is a born preacher and seems to be satisfied with his field of action. Yet it must be apparent to others that it is not his true sphere. His recent repeal and abolition of the law of evolution shows that he is capable of rendering mankind a far greater service than he possibly can by preaching, no matter how eloquently.

It is not much, perhaps, to wipe out the law of evolution. It has never annoyed the public a great deal. There has been some difficulty in that "harmonizing with the environment," which the law requires, and "the survival of the fittest" has occasionally created a natural discontent among those who were not classed with the fittest. But, on the whole, the law has operated so imperceptibly that it has not been felt as a burden. It has permeated the surroundings, of course, just as the recent destruction for the third time by fire of Dr. Talmage's tabernacle has created the general impression that Providence was more or less gently hinting to Mr. T. that his preaching was not wholly necessary to the plan of salvation, but all this has been indirect. On this account his action in wiping out the law of evolution is not likely, at first blush, to attract any marked attention.

But when the power involved is considered, the full force, meaning and significance of the act will be better apprehended. The man who can wipe out one natural law at a single stroke of his tongue, as it were, or a single sweep of his arm, can wipe out all laws that stand upon the same foundation. The mere statement of this conclusion shows what enormous power for good Mr. T. and such as he have, and how plainly it rests within their volition to become the chief benefactors of their race. Take again the example of that great and good man, the Scottish Prof. Robt. Stevenson, F. R. S., who lectured at the Academy of Sciences in this city last Monday night. He annihilated the law of gravitation, pooh-poohed poor old Isaac Newton, showed that Newton wasn't in it, so to speak, and that we had all been doddering along, supposing that there was such a thing as terrestrial gravity and the law of gravitation till the Prof. at the big stone building on Market street put forth his arm and smote that law which has hitherto bound mankind so immovably to the earth. Now this man has also mistaken his vocation. Instead of being an humble professor from a Scotch university, inventing flying machines, etc., he should, like the other law annihilator Talmage, continue in the line they have begun and smash sundry other irksome laws. There is the law of numbers, for instance, that decrees so savagely that two and two shall be four! What inconvenience and annoyance would the world not be spared if those two great repealers would relieve us from the humiliation that this law imposes! There is probably not a human being anywhere on the round globe who has not wished at times that he could make five or three by adding two and two. Let the men who have repealed the law of evolution and the law of gravitation repeal also the law which prevents such an arithmetical consummation, and receive the grateful thanks of the race. It may be that these two men, by leaving their present avocations and setting their minds solely to repeal, can even abrogate the great law of national cause and effect and give us back the prosperity that seems to have temporarily flown. The subject is a suggestive one.

SAN FRANCISCO will be well represented at the Chilean Exposition at Santiago next September, October and November. There is a good field there for the sale of mining and other machinery, and one worth cultivating.

THIS month has seen six sovereign States under martial law and terrorized by labor troubles. The trouble is mostly patched up, and now the afflicted commonwealths have the bills to settle.

Concentrates.

The mill at El Dorado canyon, Nevada, has closed down.

The recently rebuilt Bullionville, Nevada, mill has begun operations.

A small stamp mill is now in operation at the Healdeburg paint mine.

The Yellow Jacket, Idaho, quartz mill was totally destroyed by fire last week.

The Sonora Bonanza Co. of Tuolumne will resume operations on July 1st.

F. A. HEINZE, of Butte, has bonded the Deer Lodge mine in Jefferson county, Montana, for \$35,000.

The Bart and Bach mine, at Bear Valley, Mariposa county, has once more started up with a full force.

A San Francisco lady has opened the Big Crevice mine in El Dorado county, on the American river.

S. H. ROBINSON and H. C. SUMMERS, of this city, have bonded the Hancock mine, near Jackson, for \$15,000.

The Great Eastern quicksilver mine, near Guerneville, Sonoma county, has again resumed operations.

The Bisbee Copper Company has let the contract for grading its road between Fairbanks and Benson, Arizona.

"Keep away from Angels Camp," says the *Echo*. Business of all kinds and the labor market are overdone there.

CINNABAR said to contain fifty per cent of the pure quill has been found at High Ore gulch, Basin district, Montana.

The Bald Mountain Extension gravel mine, in Sierra county, yields an average of \$10,000 a month, and is worked cheaply.

The Bullion mill at Forbestown, which has been closed down for two or three weeks, will be started up again in a few days.

TWO HUNDRED tons of rock worked last week by the Standard Company at Oregon City, Butte county, average twenty dollars per ton.

The latest diamond find is reported from the Queen Charlotte Islands, but no immediate glut in the diamond market is looked for.

The Centennial mine on Duncan Hill has been sold by J. W. McCullough to a New York company. A force of men is reopening the claim.

The Denver *Record* declares that the best mining experts figure out \$620,000 in eight in the Victor mine at Cripple Creek, excluding the dump.

The Cripple Creek imbroglio has already cost Colorado \$200,000—to say nothing of the deterring influence that such lawlessness has on capital.

JOS. FRIEDMAN, of Merced, has bought the Hayseed and two other mines at Whitlock, and also two at White Rock, and has begun active operations.

The Poorman mine has had to close down because of railroad washouts in Canon creek. Superintendent Clark expects to resume work July 1st.

FROM a reliable source the Denver *Mining Record* learns that seven miners were put to sleep permanently during the late Cripple Creek scrimmage.

The Sierra Buttes mine of Sierra City has paid a twelve per cent dividend to its stockholders, and Plumas-Enreka mine an eighteen per cent dividend.

MORSE & SONE have resumed work on the Bunker Hill quartz mine. The *New Era* says they have recently placed some new machinery on the claim.

GRASS VALLEY has formed a Miners' Union, with the following officers: President, George Stacey; vice-president, Michael J. Owens; secretary, John Sullivan.

FROM the Bald Mountain Extension gravel mine at Forest City, last week, 141 ounces of gold was the result of the cleanup. Some of the gravel yielded \$30 to the carload.

H. B. CHAMBERLIN'S ASSETS were sold in Denver, Col., last week. They represented \$2,457,701.85. They sold for \$100. He wanted the earth, but collapsed last December.

NEW life is reported in the Pine Flat mining district, Sonoma county, and from present indications the famous mining district will soon take on some of its old-time prosperity.

NUOGARE weighing a quarter of an ounce have been brought into Olympia, Wash., by recent prospectors, who are very quiet as to the location of the find, but say it is very close by.

THE Miller mine, on Farmer's flat, Jackson county, Or., is about to be sold to Messrs. Dunphy, McCarthy and Bailey for \$12,000. The cleanup for this season will reach \$10,000.

THE Congress, Arizona, mine is now shipping about a carload of concentrates per day. Six teams of eighteen animals each carry the concentrates from the mill to the railroad.

RIVASIDE PAPERS say that the number of capitalists and miners of experience who are becoming interested in the mining regions of southern California is continually on the increase.

DANVAP papers say cyanide has been successful in treating the low-grades of the Denver gold belt, and a number of mills will be erected there this season. Its cheapness commends it.

THE Vekol silver mine, near Casa Grande, has closed down. Lucien E. Walker, one of the owners, died recently at Pasadena. The mine is reported to have produced over \$1,500,000.

A TWELVE-OUNCE NUOGAT was taken out last week from the old Casey mine, in Sawyer's Bar district. This is the mine from which a fine specimen, weighing nine ounces, was taken last year.

THE *Record* says: "Leadville, Col., will produce in the neighborhood of five million dollars in gold this year; Gilpin county is good for an equal amount, and Cripple Creek ought to pass the three million limit."

THE Chinese miners around Grangeville, Idaho, have been "salting" their gold dust with silver filings and quicksilver and selling it to the merchants of that place, who only got about 40 cents out of every dollar of gold dust.

THE Columbia Con. Gold Mining Co. at Yellow Jacket, Idaho, is about to build a ten-stamp mill. There are 20,000 pounds of

machinery at Ketchum, awaiting shipment by the way of Challis. The mill will be run by an electric motor.

ROBERT ELLIOTT, a miner, fell down a shaft at the Virtue mine, near Baker City, Or., last Monday, and was killed instantly. He fell over 200 feet, breaking nearly every bone in his body.

FROM a statement sent from the American Developing and Mining Company of Butte, Montana, it is learned that during the year ending May 31, 1894, the company made a net profit of \$419,235.81 in working the Golden-Sunlight mines.

THE exports of gold and silver from the port of Barranquilla, Republic of Colombia, for 1893 were: Gold and silver, various, \$786,401; bars, \$2,780,946; coins, \$216,095; gold dust, \$103,351. This is a total of \$3,885,824, as compared with \$4,342,002 in 1892.

A new shoot of ore has been struck in the Bellefontaine mine at Willow Valley. The *Transcript* says the quartz looks well and shows free gold. The owners think they have struck the old Beech shoot, from which Henry Beech obtained very rich quartz in '57 and '58.

THE old river channel near Bangor, Butte county, known as the Blue Lead, is rich in gold and many thousands of dollars have been taken from it. It is believed by many that this channel extends from Bangor to Wyandotte and through Wyman's Ravine to Oroville.

THE prospects in the prospect shaft at Dutch Flat, says the *Sentinel*, are continually growing brighter. From a single pan, the other day, a prospect of \$1.50 was obtained. Several little pieces of gold, ranging from 25 cents to \$3 have been found. The only thing needed now is enough of it.

CAMPO, San Diego county, has its monthly excitement over the alleged discovery of rich quartz and placer mines on the edge of the desert, sixty miles east of Campo, on the Picacho trail leading to the Cocopah mountains. The discovery was made by a Mexican and there are fifty men on the ground.

AT Mercur, Utah, last week the Marion Company retorted their sulphides, producing a gold brick. One of the results of the operation was about seventy pounds of quicksilver, among the first mercury produced in commercial quantities in any State east of this. The quicksilver alone was enough to pay the entire expense of retorting.

PREST. M. H. DAY of the Plumas Imperial Gold Mining Co. has bought a half-interest in five recent locations on the North Fork. Messrs. Westfield & Boyle of Nevada—the latter named the superintendent of the Alta mine on the Comstock—had been negotiating for the property, but delayed, arriving one day after the deal was closed. The property will be developed forthwith.

DURING a thunder storm at Grass Valley last Saturday night the lightning struck the pipe in the Empire mine and descended into the mine to a depth of a thousand feet, and thence into the drifts where the men were working repairing the air pipes. Two of them, in lifting a piece of pipe, were struck by lightning and knocked down. The *Union* says men working in the Granite Hill mine were similarly affected.

SIX men arrived here Wednesday from Ferguson district on their way north, says the *White Pine News*. They say there are six men there for every job. All are hanging on their eyebrows waiting for De Lamar, and unless he puts in an appearance soon there will be some getting out of there. All the available timber within forty miles of Ferguson district has been located in anticipation of a rush of business.

AT the Santa Rosalia copper mines, across the Gulf of California from Guaymas on the Baja California peninsula, are employed about 1200 men. There is a narrow-gauge road fifty kilometers in length to carry the ore to the smelter. About 1000 tons of copper are monthly shipped to Europe. The company pays large dividends. So far as any benefit accrues to this country the mine might as well be in New Zealand, though it is at our door.

"GOLD is a precious metal," explained the professor, "because of its scarcity. All the gold now in use in the world," he added, referring to a memorandum on the fly-leaf of the textbook he was using, "according to careful and trustworthy estimates, could be put within the walls of a room twenty-four feet square." "So could all the silver in the world," suggested a little red-headed boy in the class, "if you make the ceiling of the room high enough."

THE Jacksonville, Or., *Times* says Dr. Friedline and Mr. Kelly of Moscow, Idaho, are there with a patent sluice for saving flour gold. The machine consists of a double sluice-box in the form of an open-ended square, which is placed at the end of the sluices usually used. The water is divided and runs through a box on each side in which are placed screens loaded with mercury which catch what gold has escaped above. The machine has been used in Snake and Salmon rivers for the past few months and is pronounced to be a success.

A. J. McPHETRES found a 100-pound tank of quicksilver at the head of Donner lake a few days ago. It had been buried and only a little of the iron tank stuck above the surface. Against this projecting surface Mr. McPhetres accidentally struck his foot, and an investigation unearthed the tank nearly full of quicksilver. It was probably left there, says the *Truckee Republican*, by teamsters before the railroad was built, as they sometimes unloaded a part of their load before going over the summit. It has been shipped to Nevada City, where it will meet with a ready sale.

AMONG recent Northwest mining incorporations are the following:

The Phoenix Gold Mining and Milling Co., Baker City, Oregon. Capital stock, \$350,000. Incorporators, K. K. Kennedy, H. Holcomb, J. L. Rand.

The Northwestern Milling & Mining Co., Spokane, Wash. Capital stock, \$750,000, with shares at \$100 each. Incorporators, M. M. Cowley, J. Hoover, M. Thompson, S. R. Stern, W. B. Roberts, L. W. Johnson, S. Oppenheimer.

The Birch Conlee Placer & Quartz Gold Mining Co., Seattle, Wash. Capital stock, \$2,500,000. Incorporators, F. F. Reed, G. W. Adrian, R. O. Reed.

THE Lost Cabin, Utah, mine has been found again. This time only the ashes and a few pieces of logs remain to mark the spot where the cabin stood. A lot of picks, shovels, a broken Winchester, an old-fashioned six-pistol, some bones and a lot of empty cartridges were found in the ashes. The ruins are said to have been found near the headwaters of Ashley, in the

neighborhood of Bald mountain, and it is supposed that a party of miners met an untimely end while fighting for their lives, against whom the public may never know. A tunnel thirty feet long was found near the ruins of the cabin; it had been well timbered, but the timbers had rotted away, which indicates that many a year had elapsed since the mine had been worked. The tunnel was cleaned out, and a fine body of rich-looking ore was found, a sample of which has been sent to Salt Lake for assay.

Clipped and Condensed.

THE closing exercises of the Midsummer fair as an entirety will be on July 4th.

THE report that the revenue cutter *Esar* was wrecked off Sitka proves to be a mistake.

AN alleged conspiracy to blow up the Government buildings has startled the national Capital.

UNITED STATES SENATORS QUAY AND McPHARSON surprise the Senate by admitting that they have been financially influenced by the sugar trust.

IT is estimated that railroads and cities of the Northwest will have to expend \$4,000,000 to repair the damages done by the floods.

Nearly 200 miners were instantly killed and others fatally wounded by an explosion of fire damp in the Franzeiska mine at Kerwin, Silesia, last Saturday.

A suit in equity has been filed in the United States Circuit Court, in Los Angeles, by Loren Jones of New York against Mrs. Jesse Benton Fremont, widow of General Fremont, the Pathfinder, to restrain her from collecting money from Congress for the seizure of land by the Government belonging to her husband.

THE Attorney-General, Olney, has determined to enter suit against the Union Pacific and Kansas Pacific jointly and the Central Pacific Railroad to recover the amount of bonds which are guaranteed by the Government, together with accrued interest at 6 per cent for thirty years. The total amount for the three roads, including interest, is \$171,006,537.

QUICKSILVER does not go on the free list. In the Senate last Tuesday, Lodge moved to strike quicksilver from the free list and restore the duty of 10 cents per pound. Perkins said over \$30,000,000 was invested in quicksilver mines. The amendment was adopted—23 to 20. Quicksilver was placed on the dutiable list at 7 cents per pound on motion of Perkins without division. The smallest favors thankfully received.

HERR LUDWIG BAMBERGER of Berlin, an eminent authority upon the question of bimetalism and a member of the silver commission, declares, says a cablegram, that after twenty-one days of earnest discussion, no tangible result has been arrived at, but the meetings of the commission have furnished overwhelming proof that in the future no conference, either national or international, will arrive at a different result. According to Herr Bamberger, an understanding upon bimetalism seems to him impossible between the different states of Europe, including England or without England. He says the difference of the interest of the different countries precludes any satisfactory agreement.

THE Republican State Convention at Sacramento last Wednesday nominated M. M. Estee of Napa for Governor. The nineteenth and twenty-second planks of the platform are as follows:

The mines of California, with their annual output of many millions of dollars, have been our financial backbone in times of adversity; they maintained the national credit during the dark days of the Rebellion, and they form the basis upon which this grandest of commonwealths, California, has been reared. The mining industry of our State should receive such aid and protection as will insure its permanence and prosperity, and for that purpose we favor such State and national legislation as will relieve the miner from unnecessary hardships, enable him to obtain and develop his mining property, and will promote and encourage the business of all kinds of mining, including that known as "hydraulic mining," whenever and wherever the same can be carried on without material injury to the other interests in the State.

We favor the free and unlimited coinage of silver at a ratio of 16 to 1, and the making of silver as well as gold a legal tender in payment of all debts, both public and private, and we pledge our Congressional nominees to the support of the principles contained in this resolution.

Personal.

HON. FRANK MCCOPPIN has been appointed postmaster at San Francisco.

THOS. DILLON is now superintendent of the Boss mine, at Sweetland.

D. A. MACDONALD, "Alex. Quartz," has gone on a prospecting trip through Butte, Plumas and Shasta counties.

FRED CAWTHRA, president Gaston Mining Company, of Silverton, Colorado, has gone to London.

JOS. GAUNDAKMYAR of Hamilton, Nev., has a good exhibit of the White Pine ore at the Nevada building at the Midwinter Fair.

F. A. HUNTINGTON has been taking a trip through southern Oregon, and while there bought a one-half interest in the "Bone of Contention" mine on Williams creek.

PROFESSOR SNEYDER and A. C. ROUTH, with two saddle and three pack horses, left Pullman, Idaho, Wednesday morning for the wilds of Idaho and Montana on an expedition for Stanford University of California. Mr. Snyder has been commissioned by the university to collect a full line of specimens of the smaller mammals of the districts which he will visit for the museum of the institution. He will be absent all summer.

JIM TOWNSEND, of the *Homer Index*, is taking in the Midsummer Fair. He says he left the *Index* all set up and printed and full of local matter for three weeks ahead, and is here to look after his flying machine, one of the greatest inventions of the age, surpassing anything in the line of perpetual motion ever talked of. In order to bring it to a standstill after getting it once started one has to begin stopping it six hours before starting it.

Digging Gold With a Steamer.

Extravagant stories are told about the wealth of gold sprinkled through the Snake River country in Idaho. As a general thing the gold is very fine, the particles being of so light weight as to be elusive. Save when worked on a large scale it is difficult to make good wages in recovering the gold. Numerous bars along the river would prove profitable could water be commanded for sluicing or hydraulicking. An adequate supply is hard to obtain, from the slight gradual fall of the stream and level character of the outlying lands. To overcome this lack of water, as well as to insure sufficient dumping grounds, a big, floating gold-saving dredge has been constructed and is at work on the Idaho bank of the river, about ten miles above the Payette. It is a stern-wheel flatboat, propelled by steam. Substantially constructed, 65 feet long and 22 feet wide, it is equipped with a 35-horse power machine engine and boiler, and adapted in every way for navigating Idaho's great waterway. With a slight alteration it could be transformed into a steam dredge and used to scoop up sand and gravel from the bottom of the stream. As in the past, operations are now confined to working bars out of the channel of the river.

The method pursued is to anchor alongside one of these gravel deposits and by the use of scrapers bring the material to be handled within reach of the gold-washing machinery with which the craft is rigged. The gravel is scooped up by buckets attached to an endless chain. There are forty-eight of these receptacles on a belt sixty feet in length, and each has a capacity of about twenty pounds of dirt, which is delivered into a hopper. This is also an agitator, and the process employed may be described as a steam rocker with the exception that it has an end motion instead of one sidewise. The gold is caught on copper plates with quicksilver. The tailings are carried off in sluice boxes by a stream of water of 150 mineral inches, supplied by a China pump run by the engine which drives all the other machinery. The gravel is worked so thoroughly that no gold escapes in the tailings that are dumped into the river. An average of 100 tons of gravel are handled, and for this work three men are employed. —N. W. Mining Review.

1849 and 1894.

From the upper big bend of the Columbia to the Siskiyous of southern Oregon come reports of extraordinary activity in the placer mines—such golden yields as have not before been taken out in a quarter of a century. Without question the year 1894 will be second only to the golden era of 1849-50. This will be due in part to the enhanced value of gold and the cheapness of provisions and supplies, together with the opening up of new lines of transportation; in part to the diminished interest in quartz mining, which has sent an army of prospectors panning out the golden bars and gravel, and in part to the extremely high water, which enables the miners to work the higher and richer bars hitherto left untouched, and at the same time cuts new channels and tears out old auriferous drift and deposits.

In the feverish rush of 25 and 30 years ago the country was barely scratched over. A great deal of ground was overlooked, and vast areas that were unprofitable with flour at 25 cents a pound, and all else in proportion, will now give profitable returns. The Chinese followed in the wake of the early miners, it is true, but they are poor prospectors, slow workers, and cling to primitive methods, and, besides, were unable to get at the higher bars and benches.

It must not be assumed, though, that every man can take a pick, shovel and blankets and go out and find "ounce diggings," or wash out big wages. That was impossible even in the flush days of California. Some men cannot succeed at anything. When thousands of miners were working ounce diggings along the Feather and the Yuba, hundreds were "dead broke" down at the bay. Nevertheless, many will make placer mining pay, and some will take out handsome little fortunes.

There is something about placer mining that calls out the best traits of American citizenship. It fosters a rugged independence and cultivates an admirable respect for law and manhood. The placer miner seldom allows the professional agitator to lead him around. He despises tyranny and has no use for "bums," is free-handed and generous, and not given to chronic grumbling. His labors will do much this year to restore prosperity. That he may enjoy success is the wish of all. —Spokane Review.

Single-Valve Cross-Compound Engine.

The illustration on this page is of a Jackson Patent Single-Valve Cross-Compound Engine, with air pump and jet condenser direct, connected to centrifugal pump, discharging under (left-hand view), and put on Senator Wm. Johnson's place at Courtland, Cal.

Water and Gold.

Probably few persons, even among the old settlers, know of the existence of a subterranean lake in the San Gabriel canyon, says the *Azusa News*. Yet one exists, and moreover it contains gold in no mean proportions. It is situated on the north side of the east fork about one mile above Cornelius Potter's ranch, on what is known as the Don Felipe mine. It is about 50 feet above the river and about the same distance below the surface. The basin was discovered about twenty years ago by some Spaniards who were drifting into the hill in search of placer gold. Since then different parties have made developments that serve to define the exact boundaries of the water. On each side of the hill on which the lake is located are narrow gulches. A tunnel has been driven through the hill and opening into both gulches, forming an opening through the hill. From this tunnel drifts have been run in every direction just on top of the water, leaving the gravel and water underneath. In some places deep holes have been dug down into the basin and the gravel extracted, which proved to be very rich in gold. It is claimed that some gravel taken from this basin paid as high as \$5 to the pan. The hill has been completely honey-combed by drifts, and the roof is in a very bad condition, some places having caved very badly. Persons who prospected the basin claimed that it had been

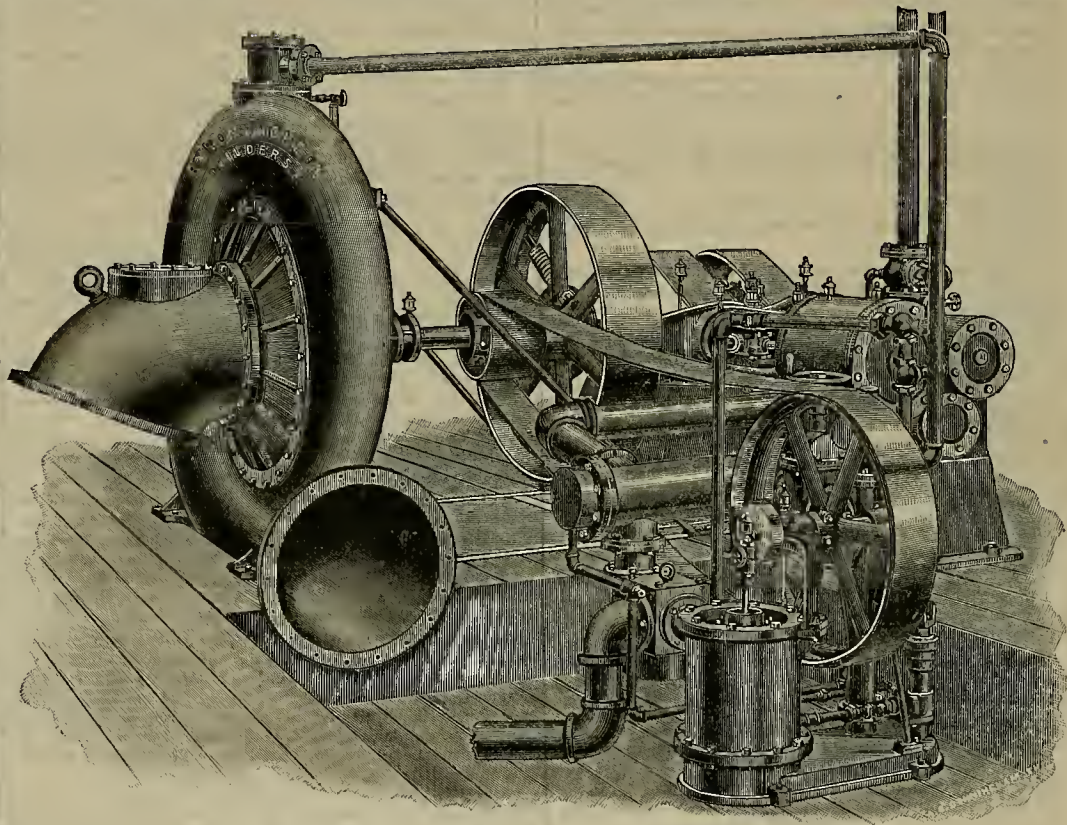
now go out with a few dollars and return with several hundreds or thousands. Some of them will make nothing better than wages, but when several thousand men put in a summer washing golden bars and channels, some of them are going to discover rich pockets and a few real bonanzas, and that adds amazingly to a country's prosperity. —Spokane Review.

The Bell Cord to Be Relegated.

The Southern Pacific company is arranging all the passenger coaches on its lines with an air contrivance by which a small whistle in the cab of an engine is caused to sound a warning to the engineer that he shall stop the train, says the *Record-Union*. The air whistle will take the place of the bell cord now in use on trains, and the change is made on account of the unreliability of the gong to sound in the engine cab when the bell cord is pulled, especially on long trains. The whistle is used by a number of large railroads in the East, and it will be but a short time before all the engines and cars of the Southern Pacific company will be equipped with it. It is operated by pressing a button.

Recent Specimens Received.

Interesting and valuable specimens are constantly being



JACKSON'S PATENT SINGLE-VALVE CROSS-COMPOUND ENGINE.

caused by the river, which at some time must have been very high, and that after washing the hole the current changed, filling it with debris. Several parties have been looking at the lake recently with the intention of draining it, and they all agree that the prospects are favorable for a rich strike, but it is in a bad condition to work. The best and about the only way would be to drive in from below and tap the basin underneath, and then work out the gravel through this drift.

Washington Placer Mining in '94.

Not since the rush to Bolse basin and the stampede to the upper Columbia in the early '60s has there been such activity in the placers. Hundreds of old diggings, mined superficially in the feverish days of 30 years ago, and abandoned because of a hope of better things and the excessive price of supplies and provisions, are being reclaimed and worked with profit. A great deal of virgin ground is also being staked out and developed, and in many places improved appliances and machinery return profits where primitive methods failed. The extraordinarily high water also makes it possible for miners to get at very rich ground hitherto beyond reach.

Perhaps this is better for the country now than prospecting for quartz ledges. In their search for quartz bonanzas the prospectors have run ahead of development. Their finds giving no immediate returns a great deal of costly energy has been expended with no compensating returns. The movement to the placers reverses this procedure. Instead of going out in the spring with several hundred dollars and returning in the fall with nothing, the prospectors

received at the rooms of the State Mining Bureau. During the week, among others, has been received a sample of lazulite from L. Gleichen, San Diego county, the first time the existence of this mineral has been noted in California.

Dumortierite—Arizona, Mrs. H. H. Day.
Millerite—Plumas Co., Cal., A. M. Gee.
Rich Cinnabar and Native Mercury—From the new ore body, New Almaden mine, Santa Clara Co., Cal., Chas. E. Derby.
Roscoelite—El Dorado Co., Cal., H. Turnbow.
Rich Cinnabar, Native Mercury and Napolite—Napa Co., Cal., B. M. Newcomb.
Beauxite—Alabama, A. J. Robinson.
Bismuthinite—England, J. F. Cox.
Crystallized Gold—Tulare Co., Cal., M. Braverman.
Opal, Zeolites, Tnpaz, etc., etc.—New South Wales, Mines Department.
Iron, Paramorph after Manganite—Arizona.
Crystallized Gold and Telluride of Gold and Silver—Transylvania, E. H. Brandt.
Crystallized Gold—Nevada, C. T. Watheim.
Hanksite, very fine—San Bernardino Co., Cal., J. W. Searles.
Labradrite—Los Angeles Co., Cal.
Rich Gold Quartz—From the new discoveries at Coolgardie, W. Australia, Jas. Parkinson.
Marble—Santa Clara Co., Cal.
Celestite—San Bernardino Co., Cal.
Platinum Ore—New South Wales.
Telluride of Gold—Siskiyou Co., Cal., Wm. Thomas.
Gold Quartz—From recent discoveries in the southern part of the State, and numerous other specimens of interest.

Obituary.

A. B. Emery, a well-known Utah mining man, died in this city of Bright's disease last week.

Amos Bowman, geologist and mining engineer, died at Anacortes, Wash., last Tuesday. About twelve years ago he was assistant editor of this paper and was a capable and painstaking man.

The Mineral Hydrocarbons.

Their History, Geography, Geology, Physical and Chemical Properties and Uses.

NUMBER IV.

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Natural gas has been known to man from the time of the earliest historical writings.

The Persian sacred fires were burning in remote ages. Emanations of carbonic acid gas and sulphuretted hydrogen in northern Italy, and in the neighborhood of the bay of Naples and on the island of Sicily, were known in the time of the earliest European historians.

On the western shores of the Caspian sea, in latitude 40-23 north, and longitude 49-53, at the termination of the Caucasus mountains, lies the ancient town of Baku. There are numerous mud volcanoes and petroleum springs on the peninsula of Apsheron. Near these springs lies the celebrated "field of fire," which was held in extreme veneration by the Parsee fire worshippers. Pilgrims from Persia still make devout visits to this locality—a remnant of an ancient custom. In ancient times a blue flame of natural gas burned in one of the temples, from the end of an earth-inserted bamboo pipe, which was regarded by fire worshippers as eternal. That it did not burn the Parsees seemed to them miraculous—at least it was believed that the sacred fire would burn as long as the world endured. Emanations of gas were so general that the priests could at any time and at almost any place, by making a small opening in the earth, collect gas in a bag and carry it away to be burned like coal gas at the present time. The flames sometimes, when the generation of gas was unusually copious, would play over a large area and seem to roll down the mountain sides.

Dr. James Mounsey, in a communication to the Royal Society of London many years ago, described the "Sacred fires of Persia," near Baku. "If a little of the surface of the earth is scraped off, and fire be applied to the hollow, it catches fire immediately and burns without intermission and almost without consumption, nor is it ever extinguished unless some cold earth is thrown over it, by which it is easily put out. But the most remarkable spot is a hole about four feet deep and fourteen in diameter. In this cavernous live twelve Indian priests and their devotees, who worship the fire, which according to their traditions has burned many thousand years. It is a very old vaulted building, and in its walls are a great many chinks, to which, if a candle is applied, the fire catches instantly, and runs instantly wherever the chinks communicate, but it may be easily extinguished. They have hollow places in the house fitted to their pots, which they boil without any other fuel, and instead of candles they stick reeds into the ground, from the tops of which, by applying fire to them, a white flame immediately comes forth and continues to burn without consuming the reeds until they think proper to extinguish it by putting small covers over it for that purpose."

The Chimæra of Lycia, near Deliklitas in southwest Asia Minor, at the site of the ancient Phaselis, was a place where flames burned continually. The ancients manifested a superstitious interest in this locality, which is mentioned by numerous writers. It has recently been visited by travelers and found to be a gaseous emission resembling the fires of Barigazzo and the gas fountain in Colusa county, California.

The mythological Chimæra was a horrid monster which continually vomited fire; one part of the body and the head were those of a lion, another part was that of a goat and the third was that of a dragon.

The following is Pliny's account of it (Book 2, chap. CX): "In Phaselis the mountain Chimæra burns with a continual flame day and night. Ctesias of Cnidos informs us that this fire is kindled by water, while it is extinguished by earth and hay. In the same country of Lycia the mountains of Hephestus, when touched with a flaming torch, burn so fiercely that even the stones in the river and the sand burn while actually in the water. This fire is also increased by rain. If a person makes furrows in the ground with a stick which has been kindled at this fire, it is said that a stream of fire will follow it."

The following is quoted from the *Iliad* of Homer: "First dire Chimæra's conquest was enjoined, a mingled monster of no mortal kind. Behind a dragon's fiery tail was spread, a goat's rough body bore a lion's head. Her plucky nostrils flaky flames expire, her gasping throat emits eternal fire."

Beleroëphon, banished from Lycia by Proteus, was sent to combat with the Chimæra, by which it was expected and desired he would surely be destroyed. But by the aid of Minerva and Pegasus he conquered. The myth is supposed to have originated from the fact that the burning mountain of Lycia near to the summit was a wilderness, in which lions lived. At a lower altitude the land was fertile

and herds of goats grazed in safety, while at the bottom the marshy lands were infested with serpents. Beleroëphon conquered by living on the mountain in spite of the lions and the serpents.

Ovid thus refers to the Chimæra: "And now she left Cragos and Lymre and the waters of Xanthus and the mountain where the Chimæra had its middle parts fire, the breast and face of a lioness, and the tail of a serpent. (Met. 9-645.)"

"And now the goddess, wearying with her long toil, being parched with the heat of the season, contracted a thirst in the country of Lycia, which has the Chimæra in it, where the violent sun scorched the fields." (Book 6-839.)

Pindar, in his thirteenth Olympian Ode, thus alludes to Beleroëphon and the Chimæra: "And of a truth the gallant Beleroëphon with blythe soul grasped the winged steed, around his neck casting the gentle charm. Straight mounting, clad in brass, he rode the warlike; with him he slew the fair host of Amazonian archers, heaving his shafts from the bosom of the cold desert air. He slew alike the Chimæra, breather of fire, and the Solymi—his own fate I shall pass: the courser Jove's stalls in Olympus received."

In the metamorphoses of Apuleius (Book 8) may be found the following allusion to the Chimæra: "My lively gait, however, proceeded not from alacrily, but, on the contrary, from fear, though I consoled myself not a little by reflecting that fear, perhaps, caused the most celebrated of horses, Pegasus, to leap all the higher when panic-struck at the teeth of the fire-vomiting Chimæra. He made a wonderful spring into the air that carried him clean to the celestial regions and acquired for him his poetic reputation."

Lucretius evidently did not believe in the Chimæra, judging from the following quotation (*Nature of Things*, Book 5):

"Since flames will scorch a lion's breast
And burn as well as any meaner beast,
How could Chimæras rise, or how contain
Three kinds, a lion's head, a serpent's tail,
A goat the middle of the fancy'd frame,
And still with scorching coostils breathing flame?"

Captain Beaufort, in command of an English survey of the coast of Lycia in 1811-1812, published a description of the south coast of Asia Minor (Karamania, London, 1817), in which he describes this fire, the modern name of which is "Yanner."

Fol. 45: "We rode about two miles through a fertile plain, partly cultivated, and winding up a rocky and thickly wooded glen, we arrived at the place. In the inner corner of a ruined building the wall is undermined so as to leave an aperture about three feet in diameter and shaped like the mouth of an oven. From thence the flame issues, giving out an intense heat, yet producing no smoke on the wall; and, though from the neck of the opening we detached some small lumps of caked soot, the walls were hardly discolored. Trees, brushwood and weeds grow close round this little crater, a small stream trickles down the hill hard by, and the ground does not appear to feel the effect of its heat at more than a few feet distant. The hill is composed of the crumbly serpentine already mentioned, with occasional loose blocks of limestone, and we perceived no volcanic productions whatever in the neighborhood. * * * Our guide asserted that in the memory of man it had never changed its present size or appearance. It was never accompanied, he said, by earthquakes or noises, and it never ejected stones, smoke, nor noxious vapors, nothing but a brilliant and perpetual flame which no quantity of water could quench. The shepherds, he added, frequently cooked their victuals there and he affirmed with equal composure that it was notorious that the Yanner would not roast meat which had been stolen. * * * This phenomenon appears to have existed here for many years, as unquestionably this is the place to which Pliny alludes in the following passage: 'Mount Chimæra, near Phaselis, emits an unceasing flame that burns day and night.'"

Captain Beaufort describing "the great mountain of Takhtain" adds (fol. 55): "They have also a tradition that when Moses fled from Egypt he took up his abode near this mountain, which was therefore called the mountain of Moses. May there not be some connection between this story and the Yanner already described? That place and the mountain are not many miles asunder and the flame issuing from the thicket, may have led to some confused association with the burning bush on Mount Horeb, recorded in Exodus."

(To be continued.)

A Little Truth—Considerable Exaggeration.

A Swiss writer who visited the World's Fair, and remained for some time, writes in a recent issue of the *Neue Zürcher Zeitung* under the headline "What Is America?"

"America is a land compared with which Europe is only a peninsula; the United States forms a country compared with which the European kingdoms are pilgrims. America

is the land of unmeasured distances and dimensions; the land of dollars and electricity; the land where the prairies are more extensive, the rivers mightier, the waterfalls deeper, the bridges longer, the lightning expresses faster, the catastrophes more terrible, than in any other country in the world. It is the land where in a single railroad accident—and one occurs every few days—more people lose their lives than in Europe in a whole year. It is the land where the houses are higher, the 'jallhrds' more numerous, the rich richer, the poor poorer, the millions greater, the thieves more daring, the murderers more shameless, the educated fewer, the teeth more generally false, the corsets narrower, the disease more deadly, corruption more general * * * the summers warmer, the winters colder, the fires hotter, the ice thicker, time more precious, the men more nervous, than in any country in our pastoral Europe. It is the land where the old men are younger and the young men older, the negroes blacker, the whites more yellow than in any other place. It is the land of immeasurable natural wealth. In short, it is the land of extraordinary contrasts, of strange extremes of nonsensical pride, of reckless money-hunting, of senseless craze for gain—the land of the colossal and the pyramidal—of course, in the opinion of Americans. How many have gone from our peaceful home to the land of false hopes to seek riches, fortune and better life and have been lost, either in the gutters of the great cities or the sands of the prairies! How many have been glad, when poor and deserted and broken in heart and soul, to sail back to their native land!"

In the Cœur d'Alenes.

J. F. Poynton, of the Cœur d'Alene mining district, who was secretary of the central executive committee of the Miners' Union during the time of the trouble between the miners and mine-owners, reports everything quiet in the Cœur d'Alene district now. He asserts that the miners are contented with the existing condition of affairs and with their wages, and show no desire to repeat the strike of '92.

"There was a rumor that the miners at Wardner would go on a strike, but it was utterly without foundation," he says. "The report was started and industriously circulated by a few malcontents, who disliked the distinction between skilled and unskilled labor made by the mine-owners of Wardner. There the skilled miners receive \$3 50 per day, and the carmen and shovelers \$3, while at Burke and Gem all the men receive \$3.50 per day. Some one set up a clamor that the Wardner carmen and shovelers were working for less than the usual wages, and asserted that the scale, which had always been considered just and equitable, was unjust. The cry was taken up, but was speedily quelled by the conservative miners, who are in the majority. They were perfectly satisfied with the scale, and would listen to no strike proposition which would disturb the affairs of the district and force many men who are willing to work out of employment. The time appointed for the strike has passed, and the men are still at work, and all the miners are satisfied with the premium on skill offered by the Wardner mine-owners, which those of Burke and Gem do not offer."

He says the Poorman, Tiger and Standard mines at Burke, the Gem and Frlsco at Gem, the Bunker Hill and Sullivan at Wardner, are running on full time day and night, and give employment to about 1100 miners and 300 outside men. "The Bunker Hill and Sullivan, which is the largest of the six, employs 350 men. The output of the mines is very large. The Last Chance and Tyler at Wardner, which are closed on account of litigation, will probably be opened soon. The Morning and Hunter mines at Mullan will also shortly be reopened, and will give work to about 300 men. There are very few idle men in the district now, and when operation of these mines is resumed, we will have to draw on other parts of the State for miners. Some of the Coxeyites might get work there, but as they showed no disposition to engage in manual labor when they were in the State, it is doubtful if they would accept it. However, plenty of miners can be had from other States. Many arrive from Colorado, Arizona and New Mexico every week and readily obtain work. Most of them are surprised to find what a prosperous district we have, and astonished to find how much it exceeds their own States in prosperity."

"Very little Eastern capital has been invested in the district lately, owing to a fear of a repetition of the labor troubles and the uncertainty involving the future price of silver. There are plenty of good prospects, which, when times grow better, will be taken up and developed by Eastern men. The usual amount of development work is being done on all of the old mines, with the usual discovery of richer ore than was expected."

"The owners of the quartz and placer gold properties on the North Fork of the Cœur d'Alene think that this will be the most profitable season they have ever had."

Electrolysis—Its Cause and Cure.

So much local interest has recently been manifested in the matter of electrolytic corrosion of gas and water pipes by the return currents of electrical street railways that the following is timely, it being the embodiment of a report of a committee specially appointed to inquire into the subject:

A thorough appreciation of the principles of electrolysis being necessary to the proper explanation of the effects observed, your committee may be pardoned by repeating some details which may be already familiar. Practical employment of the phenomenon of electrolysis is made in electro-plating, in the Edison electric meter, in the reduction of aluminum and other metals from their oxides, in the purification of sewage, etc., but the condition of its application most similar to that which we are now considering is exhibited in the well-known laboratory experiment of analyzing water by the passage of an electric current between poles immersed in the acidulated liquid, for electrolysis literally means a loosening or dissolving by electricity. These poles are called *electrodes*, the positive pole being the *anode* and the negative the *cathode*, while the liquid is termed the *electrolyte*. In the instance cited, if the object of the experiment were the production of hydrogen and oxygen, platinum poles would be employed; but if a more easily oxidizable substance were used for the electrodes, the conditions present in the analogous system of electro-plating would be produced—that is, there would be a perceptible wasting away of the substance of the positive pole, and a gradual accretion at the cathode or negative terminal. The electrolyte must be a compound substance, and in a liquid state, either by solution or fusion. When a salt is electrolyzed, the acid always appears at the positive pole and the base at the negative. In the case of water, the collection of the hydrogen at the negative pole is but another instance of its metallic behavior, and the oxygen always collects at the positive pole.

Turning now to the phase of electrolysis which we have to consider, we may briefly summarize its history by remarking that telegraphic practice had led electricians to think the earth's resistance practically nothing; hence in the earlier electric traction installations, no special attempts were made to provide for returning the currents to the power-houses. But the necessity for such provisions was soon apparent, and a form of bond wire for connection at rail-joints was introduced, the tracks being relied upon as return conductors. The use of a supplementary wire between the tracks, larger bond wires, and more attention toward securing electrical contact, followed, but with increased experience in electric-railway work, came the realization that these attempts had been little better than makeshifts, and that owing to imperfections and consequent resistance, a large proportion of the current was seeking other avenues of return, and was causing injuries by so doing.

The realization of this condition by no means came all at once, for railway managers were at first loath to believe the operation of their dynamos responsible for the reported damages to the telephone cables and gas and water pipes, but ascribed the corrosion to chemicals in the soil or other causes, and doubtless looked upon the loss of their current as a necessary evil attendant upon the method of propulsion employed. Some of the earliest experiments to locate the source of this corrosion were those of Mr. I. H. Farnham of the New England Telegraph & Telephone Company, Boston, who exposed short lengths of cable to all the conditions affecting the corroded cable, except that of connection with the system of wires, and found them unaffected after an exposure during which the neighboring connected cables were badly injured. Many other tests have been made, and there is now a full agreement by both the owners of the buried pipe and wire systems and the street-railway people as to the cause of the trouble, all uniting in ascribing it to the earth returns of the enormous currents used in electric traction.

Having agreed that the grounded current is responsible for the injuries we have observed, let us see the manner in which it acts. No effect is produced where the current reaches the pipes, for this is a negative electrode, and would be receiving a deposit from the rails and bond-wires, if any action were apparent. Neither is there likely to be any damage in the body of the pipe, unless a small connecting line should be encountered whose greater resistance would cause heating, or the presence of joints of higher resistance (due to leaks, or the use of cement) should force the current out, to return a few inches farther on. But the injurious action occurs at the point where the current leaves the pipes to enter some conductor offering an easier path. This will usually take place opposite the power-house—where the current is also greatest in quantity, owing to the accumulated returns from the entire line—and at points where pipes cross beneath the tracks, the current returning to the rails with especial readiness if the direction of the pipes no longer coincides with that of the railway. Here

the conditions of our laboratory experiment are reproduced. Of two points where rails and pipes are equally distant, the greater flow of current will take place where the greater moisture exists. This moist earth then is our electrolyte, made specially effective by the gas, ammonia from animal refuse, salt from melting snow, or other chemicals present in the ground; the pipe is our anode, and the rail or other objective point of the current the cathode. The metal of the anode or positive pole is gradually carried in the direction of flow of the current; and the electrolysis once begun, the oxygen and ozone of the electrolyzed moisture collect at the positive pole and aid in attacking the pipe. The rapidity of its destruction depends on the quantity of current passing rather than upon its voltage; and instances are on record and in the knowledge of your committee where a single month sufficed to destroy new service pipes.

Verbal expressions from several sources, as well as certain published discussions, seem to indicate that the full extent and effect of this electrolytic trouble is but vaguely realized by many of us. Some of us may think that not having found any ill effects ourselves, the question, though an interesting one, deals with a matter that does not touch us directly. Your committee would emphasize this statement, that no city in which an electric road is operating with any part of the return through the ground, has its gas and water pipes wholly free from electrolytic action; the fancied immunity is the security of incomplete information. To draw attention to the widespread nature of the trouble, a portion of the appendix accompanying this report is devoted to published accounts of damaged pipes. The greater number of complaints come from the water interests, for two reasons; first, greater conductivity, for the water mains range greater in size than gas mains, the absence of cement joints decreases their resistance, and the contained water may add to the conductivity; and second, the greater pressure carried more quickly occasions a break. But the gas mains are beginning to indicate the action upon them, and will do so more and more unless effective remedies are soon applied. When we realize not alone the immense capital buried in our water and gas distributing systems, but the fact that street improvements have made repairs to our pipes additionally expensive, we may begin to appreciate the serious character of a condition which divides by 5, 10, 50, and even 100, the life of a pipe, and which, until the cause be removed, may repeat the operation on the replaced line in an equally short time, or accomplish a similar injury at another point where its action will be less readily located.

Coming now to a consideration of the remedies, we will first notice those which have been suggested for adoption by the gas and water companies. Probably the earliest of these was that of coating the pipes with non-conducting paint or a covering of similar purpose. A parallel of this is the use of drain pipes of slightly greater diameter than the metal ones, slipped over the latter and cemented at the joints and at ends. These have been adopted with special convenience for service pipes crossing under the rails, but their value is dependent upon the local circumstances. If the corrosion at such a place is caused by the current flowing downward through the earth and so entering and leaving the service at about the same points—placing it in an electric bath, as it were—such a covering should prove a true protection. But if the current had reached the line through some imperfection at a point farther away, and caused the corrosion by leaving the pipe to return to the rail, any insulation, if locally effective, would cause the current to seek a different avenue of exit, and so merely transfer the point of corrosion. A determination at such places of the direction of the current, whether from or to the rail, would show whether or not a non-conducting covering would be effective. Incidentally, the adoption of insulation at the current's point of departure would increase the resistance of the mains and so decrease the proportion of current carried, but complete relief by the plan suggested would require encasing of the entire distributing system, and as a final curative it may be dismissed as impracticable.

The same reasoning applies to the method adopted on certain lines of water pipe in Los Angeles, which were laid in conduits filled with sawdust, and also to the use which has elsewhere been made of a covering of pitch, kept in place by boxing of convenient form. All these protectives are too costly for general adoption, and no partial installation of any of them would wholly cure the trouble. * * *

In the earlier days of the "broomstick trains," the practice as to current direction was not as uniform as it generally is now, for in some plants the dynamos were run with the positive pole to the trolley wire, and some with the negative. In the latter cases, electrolytic effects were produced along the entire line wherever the current would find a ready path from pipes to rails, so that locating the injuries was a much more difficult task. As the car motors take current either way, however, reversing the current's

direction was an easy matter—especially in places where but one electric road is operating—and has been very generally done. The liability to corrosion is thus brought to within a narrower range, and largely localized in the neighborhood of the power-house.

Most prominent in point of number among the remedial devices adopted by the railroad companies are those for securing additional electrical contact at the bonds, and obtaining a bond conductivity approximately equal to that of the rail itself. The necessity of greater attention to this latter point is shown in the tables which have been published of relative conductive areas of the several sizes of rails and bonds in use; it has been customary to bond 56-pound rails, for instance, with No. 6 B. W. G. copper wire, whose relative conductivity is but one-twentieth as great. The use of the customary sizes of supplementary wires between the rails is by this comparison shown to be equally ridiculous and ineffective; one writer remarks that it is "laying a 12 inch water main and then putting a one-half inch pipe alongside to help it out," and it has been well said that the weight of copper now used in supplementary ground wires would be much better employed in the form of heavier bonds. * * *

The use of the "three-wire system" on electric roads has been advocated by Mr. W. Nelson Smith as a deterrent of electrolytic corrosion, and has been in operation at Portland, Or., for the past two years, with reported success. In its application for this purpose on a double-track road, the trolley wire above one track serves as the positive, the other as the negative, and the rails and earth as the neutral wire. There may be a potential difference from earth of 500 volts to each trolley wire, and of 1000 volts between them. The rails or neutral wire merely carry the current required by the difference in load on the two sides of the line, which is only considerable when cars are starting out or going in, and in the morning and evening business and home travel, or in cases of "hunching." The difficulties in overhead construction and insulation are increased, but it is said that only one-fourth to one-half the overhead copper is required as for a two-wire all-copper system, such as the double trolley.

A common practice is to bury at certain points on the car line old car wheels, rails, or other forms of plates to collect the ground currents connected by supplementary wires to the power stations. But instances are known where such supplementaries have been used of so great length and consequent resistance, that instead of carrying the current back to the dynamos, they were found by test to be actually positive to the earth. Their insufficiency is more explicitly shown in the experiments of Mr. J. D. Rastron, Chief Engineer Union Railway Company, Chester, Pa., whose tests showed in one instance that the track and ground supplementary wires were carrying 235.5 amperes of current, the city water mains 12.8 amperes, and the plates, though connected with an unquestionably thorough ground in a creek, but 0.5 ampere. This was doubtless a case with exceptionally unfavorable conditions; but even under propitious circumstances, no great proportion of the current could be expected to reach the isolated ground plates, of relatively small earth contact, as compared with the quantity following the long and heavy lines of pipe so widely to be encountered by earth currents.

Recognizing that the currents must follow the main pipes to some extent under existing conditions of railway practice, and that the injurious effects are produced at their points of leaving, the water department in Cambridge, Mass., has had heavy copper wires attached to the water mains and carried to the negative generator terminals of the electric roads, that the currents collected by the mains might leave them by a metallic circuit. The water pipes were also connected to the rails, and the water and gas services wired together within the cellars along the route of the road; intentional use thus being made of the pipes as conductors. In Milwaukee, the railway company connected its rails to the fire hydrants, but provided no means for the departure of the current until prevailed upon to supply an attachment near the power station. Elsewhere it has been proposed to run feeders to the power houses from the mains in various sections of the city, but not to connect the mains directly to the rails; in other words, to employ the mains, but only as a huge system of collecting ground-plates.

Of the three grades of this arrangement, the last is preferable, but even that is by no means desirable, for it serves to increase the conductive power of the pipes and so invites the approach of currents; and while no especial harm might be done to a perfectly tight water main so wired, a pipe having leaks or loose joints, or a gas main with cemented bells, would be speedily affected injuriously. Nor should the suggested attachment to water mains alone be permitted without protest by gas companies, for if the water mains be made better conductors than before, more tendency will be manifested by such vagrant currents as may

have reached the gas pipes to leave them and enter the water mains, so spreading the likelihood and locality of electrolyzation.

Mr. I. H. Farnham, in a recent paper before the Institute of Electrical Engineers, gives the following description of still another plan:

"Prof. Elihu Thomson suggested placing motor-generators along the railway line wherever the cables and pipes are found to be in danger, to be operated by the railway power current, the secondary current developed by these generators to be utilized to lower the potential in the cables and pipes to zero with respect to the surrounding earth or rails. The suggestion included means for automatically starting and stopping the generators, as cables might become positive or negative to the rails. The motor-generators would, so to speak, pump the current out of the cables and force it into the rails whenever the potential of the former should rise above zero. This plan has not yet been put into operation so far as I am aware."

Among the devices described in the foregoing paragraphs are most of those which have been adopted to any extent by the railways as preventives of electrolytic action. As deterrents or diminishers, many of them assist, but not one fulfills the requirement of complete protection, nor can any system do so which uses the rails to any appreciable degree as conductors. On many of the lines of electric railways—perhaps on most of those within the cities—the rails lie parallel for long distances with lines of gas and water mains, much better conductors than equal columns of earth, and in cases of poor bonding often exceeding in conductivity even the rails themselves. Separated from the latter only by a strip of earth, more or less moist, the capacity of the rails to conduct all the current is subject to the conductive law of inverse resistances, for so long as the rails offer any resistance at all, some current will also follow the lines of higher resistance. The pipes will be called upon to bear a portion of the current under the most favorable circumstances, and, so doing, will be injured, for it has been shown by experiment under conditions identical with those existing in practice that electrolytic action may occur with differences of potential of 0.5 volt.

It has been claimed that the perfection of the alternating current motor in its application to street railway work would solve the problem of electrolysis, and the advantages of this system for long-distance power transmission have caused it to be considered for adoption on the Erie Canal trolley line. But though faith in the inability of alternating currents to exert electrolytic effects is not universal, we need not consider the pros and cons, for the motor in satisfactory form is not yet on the market, and the immediate solution of the question before us must be sought apart from its improvement.

A system which many large roads are now adopting as a means of decreasing their current leakage is that of using insulated track feeders designed to carry the entire current, joined to the rails at short intervals, each 400 or 500 feet, for instance. The rails are thus employed as conductors only between the feeder junctions, and the liability of leaking currents is very much reduced. The system is certainly a step in advance of anything we have yet considered; and having been adopted in Boston, Brooklyn, Cleveland, etc., we should soon bear it, by its use, destruction of the pipes is wholly avoided. * * *

Another class of injuries from the same general source as the electrolytic has been brought to the attention of your committee, namely, arc effects caused by short interruptions in the continuity of the metallic lines made to serve as conductors. Of this character were the cases in Boston, where the yarn was ignited in the bells of pipes which were being laid, and in Indianapolis, where the leaking current followed down a trolley pole and burned a hole in the natural-gas main close by, the escaping gas from which returned through the hollow pole and was lit at its top, destroying a considerable extent of the neighboring overhead wires. There the railway's system was the greater sufferer; but such poetic justice as this seldom follows. The solution of the electrolytic question, however, will largely carry with it the prevention of this class of effects, so that they need not be specially considered.

In detailing the several plans which have been tried or suggested for the abatement of the troubles which we are considering, your committee have endeavored to show warrant for their belief that the full remedy for the difficulty cannot be applied by those who are suffering from its effects, but is attainable by the railway companies, and must of necessity rest with them. That they will endeavor, if assuming the cost of the work, to adopt the cheapest method which offers a measure of protection to the pipes, is of course to be expected. But their responsibility and liability once fixed, we may insist upon their adoption of an absolute preventive, or their rendering of adequate indemnity for all electrolytic injuries to our systems.

The regulations adopted by the special joint committee

of the two English houses of Parliament, to be applied to electric traction companies installing their systems under the jurisdiction of the Board of Trade, are much more stringent than any which have been proposed in this country. Our object is to secure the proper protection from injury by systems already in operation, of a quasi-public nature and occupying the streets like ourselves, whose extension we would not seek to hinder or whose methods to question except as they entail danger or expense upon us to our exercise of rights and duties equally important with theirs, and materially antedating them in introduction.

Mr. H. H. Humphreys, in his paper on this subject before the Electric Club of St. Louis, remarks:

The courts have decided, in numerous telephone cases, that the street railways have a right to the use of the earth as well as other people; but the question whether they would allow the railroad companies to use the gas and water pipes, and by using them, use them up, has never been decided that I know of.

The Supreme Court of Tennessee has held, however, in an issue on behalf of a telephone company whose operation was affected by induction at the advent of electric traction, that it was not the legal duty of the telephone company to protect itself, but that it devolved upon the railway company to refrain from causing injury.

In several places where the water supply is conducted by a department of the municipal corporation, the commissioners have notified the railway managers that their companies would be held accountable for damages to pipes, and that the supply of water to their power stations was liable to interruptions unless the source of danger was removed. With the realization of the actuality and extent of the danger, water companies and departments all over the country are taking steps toward obtaining an understanding with the railways causing the trouble, and especially in the cases of such cities as include water supply as a function of the municipality, the gas companies cannot do better than co-operate with them for mutual protection. If personal and corporate interviews and correspondence with the railway people fail of their object, the courts may be appealed to for restraining orders. Application for a stay of the injunction would doubtless be made on behalf of the railway, and the equity of the question would then be brought to a hearing. But meantime the deterioration of the pipes would be progressing; and even with the installation of a double trolley system decided upon by the railways, some time would elapse before it would be completed. Your committee would then recommend the insulation of all renewed pipes in places found to be injured, the drain tile casing being probably the best for services and small mains, and boxing filled with pitch for larger mains, and the use of cement joints in any new main being laid. The detection of leaks and the determination of unaccounted-for output are so much easier to gas than to water companies that any marked losses on the gas-pipe lines at least are likely to be signalized in some manner readily recognized.

In justice to the railway companies, it must be said that they are fully alive to the serious character of the problem which confronts them, and are equally anxious with ourselves to remedy and avert the trouble. They have a vital interest in the matter apart from the liability under which they rest for damages to other underground metallic systems, for the solution of the electrolytic question means to them a marked reduction in operating expenses, greater efficiency of the motors, and relief from the menace of interrupted water supply. But they naturally hesitate to accede immediately to demands which would involve the reconstruction of so considerable a portion of their plants; and as one of the electrical journals states, while the double trolley would remove all cause for complaint, the railway companies will exhaust every other means before going to the expense which that remedy would involve. But with recognition of the justice of claims for indemnity for injuries to our distributing lines, and a clear demonstration, such as is now being afforded in several directions, of the futility of any half-way measures, we think that the street railway world will eventually concede the superiority of the double trolley and its kindred systems.

Your committee then summarize their findings as follows:

First. Electrolysis from the grounded currents of electric roads is rapidly injuring gas and water pipes, and it is admitted by street railway people that the injury does proceed from their operations.

Second. Complete relief from its action cannot be reached by any device applicable by those injured, but is attainable by certain changes in the electric railways.

Third. The gas and water interest should unite in demands for remedial measures which shall secure the adoption of systems undoubtedly effective, and which will thereby avoid a revival of the question a few years hence.

Fourth. Pending the discussion or completion of the relieving systems, the pipes should be protected at exposed points, at which the policy of increasing the resistance by insulation should be followed rather than that of increasing the conductivity by wiring.

Distributing Cold.

The distribution of light, heat, water, power, and even human speech, from a central station has been an accomplished fact so long that it attracts no attention. The artificial production of cold, as illustrated in various chemical and domestic operations and in ice factories, is also a familiar process; but the successful distribution of cold from a central station is so recent as to be known only to a few. This is now accomplished over large areas. Cold is but the absence of heat; it is therefore only necessary to cause the heat in any space to disappear to produce a low temperature, or cold. The removal of heat must, then, be the principle involved in all refrigeration.

The production of cold at widely different places from a central station, accordingly, does not differ in principle from its production in an ice factory. While this is true, the engineering difficulties in the pipe-line distribution of cold were very great. It has been unsuccessfully attempted at various places, including London, New York, Boston and Paris, but is now in successful operation in Denver and St. Louis.

In these plants the agents for producing cold is liquid ammonia. This substance, says a writer in the *Cosmopolitan*, is liquefied at the central station and transmitted through iron pipes, under a pressure of 150 pounds to the square inch, to the places to be cooled. At these places the liquid ammonia flows through an adjustable opening in a small valve into one end of an expansion or cooling coil. The other end of this coil is connected with a return pipe, leading back to the station. The boiling point of liquid ammonia, under atmospheric pressure, is about 30 degrees below zero, so that any temperature above this will boil it away very rapidly. This boiling away, or evaporation of the liquid ammonia in the expansion coil, cools the surrounding space and the temperature desired is obtained by regulating the rate at which the ammonia escapes from the main. A constant suction is kept up in the return pipes, so that the vapor of ammonia returns to the central station for repeated use.

In this process a liquid fills the outgoing pipes and vapor the return pipes, which is just the reverse of the steam-heating process, where vapor fills the outgoing pipes and liquid flows in the return pipes. In steam-heating from a central station, there is much loss by radiation from the mains; in the refrigerating process there is no corresponding loss, as the liquid ammonia is passed through the mains at ordinary temperatures.

The system described admits of many applications, the most ordinary and important of which at present are the cooling of storage boxes for hotels, restaurants, saloons, butchers and butter-houses, and in enabling hotels and cafes to make their own ice; in cooling water for large stores and factories, and in cooling soda-water fountains. Among the luxurious applications may be mentioned the cooling of summer cafes and dining-rooms to any desired temperature. In St. Louis 10 or 15 degrees between the inside and outside temperatures were found most satisfactory. For this room-cooling the same pipes used as a cooling coil in summer are used as a steam radiator in winter.

The area that can be supplied with cold from a single station is about the same as can be supplied with illuminating gas. This new industry can never become as general as those mentioned in the beginning of this note, for "keeping cool" is in many cases a luxury rather than a necessity.

State Mining Bureau.

It strikes us that not enough attention is paid to this most important bureau. Half of our people don't even know where this institution is located, further than it is somewhere in San Francisco. If every person who visited the Midwinter Fair had also visited the State Mining Exhibit, they would have learned considerable about the mines in the various counties, more, we dare say, than they could learn at the fair. At the fair the mining counties put forth their best foot and boomed their exhibit way up; at the State Mining Exhibit the exhibits are permanent (so to speak). No gaudy rock is shown here—nothing but the real thing and things as they are. The State Mineralogist, J. J. Crawford, has a corps of efficient assistants who are always both willing and anxious to show visitors through the building. They take pride in having visitors, for it shows that the people in general take an interest in mining matters.

We would like to see the papers in all the mining counties take up and agitate this most important matter, and feel sure it would redound to the everlasting benefit of the miners. Remember that the State Mining Bureau is located in Pioneer hall, No. 24 Fourth street, below Market, San Francisco, and don't fail to call there when next in the city. The admission is absolutely free.—Downville Messenger.

Scientific Progress.

Origin of Petroleum.

Mr. J. J. Jahn, in an article, "Zur Frage über die Bildung des Erdöls," states that in his study of the Silurian rocks of Bohemia he found in a dolomite of the Pridoli valley that the hollow portions of fossils—such as the chambers of *Orthoceras*, or the space enclosed by the two valves of a *Lamella*—often contained a sort of nucleus of little lumps of anthracite or drops of petroleum (sometimes both substances), while the rest of the drusy hollow was taken up by calcite or dolomite crystals. The same occurrence is noticeable in the limestones near Stolba, and not only are the anthracite lumps and petroleum found in immediate connection with the fossils, but they, as well as mineral wax, occur disseminated in the mass of the rock itself. These substances, whether in intimate connection with marine shells, or apart from them, are evidently the result of the decomposition of the animal organisms which, ages ago, were buried in the calcareous mud of the Silurian sea.

The author considers that his observations herein confirm the views of Prof. C. Engler, who attributes the origin of petroleum to animal organic remains, and has succeeded in artificially producing that substance and its by-products from animal matter. It is now seen that the idea that a large quantity of coal necessarily implies a paucity of petroleum, or the abundance of the latter, the scarcity of the former, in any particular locality, is erroneous. Wherever the Silurian limestones of Bohemia contain anthracite, there, too, either petroleum or bitumen is found; and one is impelled to conclude that the formation of coal by the decomposition of vegetable matter went on concurrently with the formation of petroleum by the decomposition of animal matter. The author thinks, moreover, that some anthracite may well be of animal origin; it may arise, perhaps, from the decomposition of masses of the chitinous skeletons of Graptolites.

The conditions of temperature and pressure which Prof. Engler found necessary in his experimental manufacture of petroleum probably obtain in nature as a result of the crumpling and crushing of the earth's crust, and of the eruptions of igneous rock which not seldom accompany these phenomena. It is a striking fact in this connection that the Stolba limestones become more dolomitized as they approach the neighboring eruptive rock, diabase.—Jahrbuch der K. K. geologischen Reichsanstalt, Vienna.

Chemical Change from Mechanical Energy.

H. Carey Lea, the scientist, is at work trying to produce chemical change from mechanical energy. Light has the effect of darkening and reducing or disintegrating certain salts of silver bromides and iodides. Mr. Lea finds that he can produce similar results merely by compression. In some of his attempts he exerted a pressure of 1,000,000 pounds to the square inch.

From a commercial point of view this is a valueless expedient; but a principle has thus been established. Now, what the physicists would like to know is whether that operation can be reversed and chemical change can be made to yield mechanical force directly. In a primary or secondary battery chemical action produces electricity, and this can then be converted into mechanical force. So, too, by burning we get heat, and then can turn heat into power. But what certain investigators are trying to ascertain is whether the intermediate stage cannot be dispensed with, and if so, how. The particular object in view, or at least one important aim in this inquiry, is the discovery of a way to obtain from coal something like the full amount of energy that is stored up in that familiar compound. It has been as-

serted that by our best methods of combustion in connection with a steam boiler and engine only about one-tenth of the work is extracted which the sun placed on deposit therein away back in the vegetative processes of the carboniferous era. A tremendous revolution in the methods and cost of all manufacturing operations and in propelling cars and ships would be wrought if ever a secret of this sort were wrung from Nature. And her mysteries, it is safe to say, are not yet all unravelled.

The Electric Utilization of Niagara.

The necessity for having manufacturing establishments located where the water wheels are has greatly limited the use of water power. Now that electric energy can be transmitted to great distances on wires, one may have his source of power with a dynamo where the water power chances to be, and his factory with its motor where it is economically best to put it, and these places may be many miles apart, and many rivers may be made serviceable which have hitherto been but a waste of power.

One of the largest of these is the Niagara river and falls, where about 18,000,000 cubic feet of water flows per minute through a descent of more than 300 feet, including both falls and rapids. This represents something like 10,000,000-horse power. For the utilization of a portion of this a company has constructed a tunnel about a mile and a half long, running under the town of Niagara, from the river above the falls to a point just beyond the foot-bridge below the falls and a few feet from the surface of the river, giving nearly 200 feet for a head of water. The capacity of this plant is 100,000-horse power, and there are to be many turbines, some of them 5000-horse power, for driving 5000-horse power alternating dynamos intended to maintain a current at 2000 volts.

Manufacturing establishments in the immediate vicinity will probably have wires connected directly to the dynamos, but factories at a distance of ten or more miles will have the voltage raised by transformers to 10,000 volts or more, and again transformed to lower voltage where the power is to be utilized. This process is to save in cost of conductors, for a given amount of electrical energy of high voltage requires a smaller wire than if the voltage is low. A number ten copper wire, which is about an eighth of an inch in diameter, which will conduct, say, 30-horse power at 1000 volts, will conduct 100-horse power at 4000-volts. It is expected, says a writer in the *Cosmopolitan*, that most of this power will be used for motor work rather than in lighting, and Niagara companies have been organized in several cities and towns about some of them at the distance of 100 miles or more, with the probability that ultimately some of the energy may reach even New York City. It seems likely that the region about Niagara will soon become a great industrial center, where all sorts of mechanical enterprises will be grouped, because power can be had cheaper than elsewhere. There are many questions concerning the economical distribution of electrical energy that will be settled by this Niagara plant, and engineers are watching the developments with great interest. After these are settled, by experience, water power in places now inaccessible for manufacturing purposes will suddenly become valuable properties for electrical power stations. No one need feel apprehensive that Niagara falls will be seriously affected by this seemingly large draught upon its water supply. In reality it represents but about one-fortieth of the bulk of the water of the river, and several such power plants might be established there without diminishing the flow appreciably.

THOMAS KELLY of Keokuk, Ia., writes that evidences of a pre-glacial river have been found, which in earlier ages drained

Lake Michigan westward into what is now the Mississippi river. Some of the places where this river ran are covered by nearly 200 feet of deposit, but the silt which occupies the river's bed is black and contains shells which show remains of earlier animal life, probably before men lived on this planet.

M. LOUIS BOUTAN has succeeded in taking some beautiful photographs of the bottom of the sea by the aid of a newly invented lamp for burning magnesium powder under the water. He first descends to the bottom and selects his views, next has his apparatus lowered to him, then arranges the same for several flashes, enabling him to take as many successive pictures.

THE great Pitch lake of Trinidad covers 99 acres and contains millions of tons of so-called pitch. This is in reality a mixture of asphalt and oil, which is continually oozing up through cracks and crevices beneath the pressure of the strata of rock above.

THE cylinder head of a Connecticut locomotive blew out while at full speed. The train's momentum carried it to the station five miles away without a pound of steam.

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The World's Gold Supply.

The most eminent living writers on the precious metals, Suess and Soetbeer, have recently published what the New York *Telegram* calls a very alarming statement. It is to the effect that the total amount of gold dug out of the earth annually suffices only to supply the present demand for that valuable substance for use in the arts. Not a bit of the new product of the mines is available for coinage. Trinket use and waste in manufacture exhaust the whole yield. If this is correct, then gold must vanish from circulation before long, because the output of the gold mines of the world is diminishing rather than increasing, and there are few fields left to explore. But Uncle Sam's metallurgists say that it is not so. The writers quoted fail to consider the fact that the gold employed in the arts is utilized over and over again. It goes through a sort of cycle. Articles of jewelry often disappear, but are seldom lost. When, through accident, they pass out of the possession of the well-to-do, they go to the poor and sharp-eyed, who sell or pawn them. Some jewelry is lost by fire and some in the sea, and these losses are absolute and hopeless; but jewelry otherwise is certain, practically, all of it, to find its way, sooner or later, to the pawn shops or into hands of dealers in old gold. Thus it is melted up eventually and reappears again in other shapes. This is what is termed the "invariable supply" of that metal.

There are a number of unavoidable causes of loss of gold. The first and most important of these is by abrasion. Jewelry loses much weight in that way, especially rings, which are usually eighteen karat and are worn rapidly. Coins suffer much less, but still considerably from wear. All gold leaf is a total loss to the gold stock of the world. Where used for decorative purposes it is never recovered. It is not employed for filling teeth nearly as much as formerly, "porous gold" being substituted. But, of course, the gold utilized for filling teeth is a total loss, and in the aggregate it is enormous in quantity. If it be supposed that the average dweller in cities of this country has 50 cents' worth of gold in his or her mouth, which is placing the figure very low, it will be seen how great is the waste in this form. Each succeeding generation takes so many millions of dollars' worth of the metal from the world's stock in this way. Some gold is lost in remelting, though all possible means be taken to reduce it to the lowest possible figure. Not only are the floors swept and the dirt treated for the recovery of the yellow substance, but the wooden planks are burned eventually with the same object. Even the shoes of each man who works with the metal are subjected to the chemistry of fire, yielding a small "button" of the precious metal.

To Penetrate Iron Shutters.

Ever since iron shutters and doors have been used upon warehouses, factories and other buildings to protect their valuable contents against damage and destruction by fire, the problem of effectively and immediately reaching a fire behind those shutters and doors has baffled the fire departments, and at the present time they have nothing more effective than axes and bars, or to wait for the shutters to become so hot that a stream of water thrown on them will cause them to warp or crack open. In the meantime, the goods protected have furnished fuel for the fire.

There are drawbacks to cutting holes in the roof in order to get access to the flames, one of them being that a draft is thus opened, which promotes combustion and increases the peril.

The water introduced through the open-

ing generally fails to reach the fire, the fireman being unable to see the point at which it should be applied.

These iron doors and shutters frequently



THE APPARATUS IN USE.

have a hole large enough, near a bolt, to admit a hand. Sparks are liable to enter this opening and to prevent this, some shutters having a swinging disk covering the hole. Another kind of shutter is provided with an automatic latch that can be released by a heavy blow.

The fatal objection against shutters with

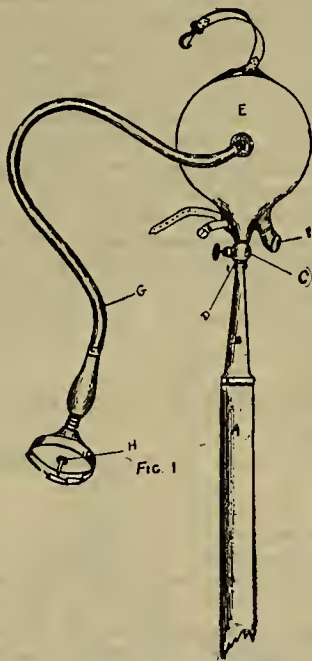


FIG. 1.—A, Fire hose connected to engine or hydrant. B, Nozzle. C, Water pressure valve. D, Coupling to connect the nozzle. E, Water motor. F, Exhaust. G, Flexible shaft. H, Cutting tool.

any of these appliances is that they are not burglar-proof.

The law calls for shutters provided with openings that bars may be inserted, but these are so evidently insecure against sparks from neighboring buildings and the attack of the burglar that they will not be used when it can be avoided.

John G. Von Hofe of New York has invented a simple mechanical device, which utilizes the hydraulic pressure of the water in the hose used by the firemen at the fire.

This apparatus is attached to the end of the hose and in a moment the fireman is able to pierce the iron shutter or door or to cut away the iron bars and throw water on the fire immediately.

This arrangement is easily carried on the fire truck or on the patrol wagon.

The apparatus weighs about 40 pounds, and with a pressure of 75 pounds it attains one-half horse power, and makes about 1200 revolutions per minute.

A pressure regulating valve is located between the motor and the fire hose, and a

novel arrangement in the handle stops or starts the tool while the shaft is spinning.

The manner of operation is briefly described as follows: When fire occurs in a building protected by iron shutters and with all means of access cut off, the fireman erects a ladder to the window, hangs the apparatus on his shoulder and ascends.

When in position he hangs the apparatus on the ladder by a snap-hook, securing it firmly by a strap.

The hose is then connected with the apparatus; the fireman grasps the handle and the water is turned on.

The fireman in a moment cuts away the bars or pierces the shutter; then detaching the hose, pours water on the flames.

The following will describe the figures in detail:

Fig. 1 is a general view of the apparatus consisting of a motor attached to a flexible shaft and a set of interchangeable tools adjusted to this shaft.

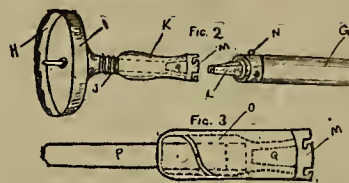


FIG. 2.—G, Flexible shaft. H, Cutting drill. I, Casing for cutting drill. J, Spring to adjust the casing. K, Handle. L, End of flexible shaft. M, Interchangeable sleeve. N, Sleeve fasteners.

FIG. 3.—M, Handle with sleeve. O, Spindle with cam for reciprocating movement. P, Double-edge saw.

Fig. 2 shows one form of drill, the center point projecting beyond the outer teeth enveloped in a casing, which protects the fireman from injury.

When this drill is connected with the shaft, and held to a metallic shutter, the central point pierces a hole first, and as the handle is pressed forward, the casing or guard rests itself against the shutter, causing the cutter to present itself squarely to the surface.

As the handle is forced forward, the spring back of the guard allows it to recede; at the same time the circular set of teeth move forward with 1200 revolutions a minute, and in a very short time a hole large enough to admit a hand is made. The hose is then disconnected, and, should the fire be too close to allow opening the shutter, the hose is put through and the water poured on the fire.

Fig. 3 shows a saw with teeth on either edge for cutting iron bars or grating. The saw has a reciprocating movement from a cam within the handle.

This instrument is used where the building is guarded by iron bars or grating, but can be instantly removed for the circular cutter before described.

Founded by Mathew Carey, 1785.

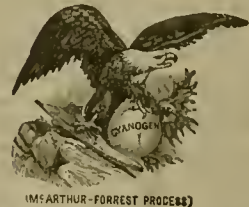
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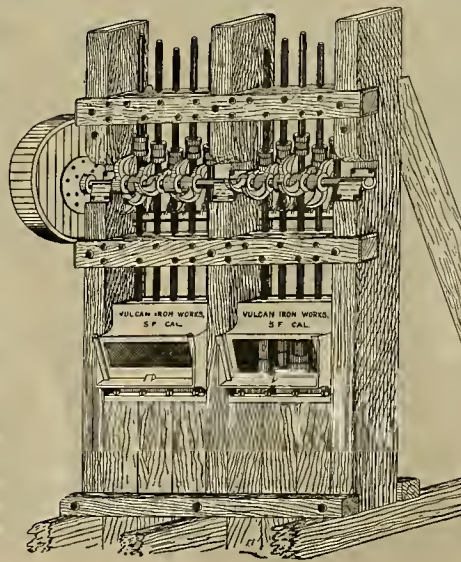
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Electric Progress.

Batteries for Use With Telephones.

Some confusion prevails in the public mind regarding the use of batteries in connection with telephones. In operating these instruments electricity is used for two purposes, to ring a call-bell and to convey speech. Customers, direct or indirect, of the Bell Company operate the call with a magnetic device, a diminutive dynamo, turned with a crank, and hence no battery is needed. But in some of the other outfits, which are sold outright and not rented, this service is performed with what is called an "open circuit" primary battery, either wet or dry, the number and kind of cells depending on the length of the line and the frequency of use. A storage or secondary battery is also available. In a building already wired for incandescent lighting, such a call or door bell could be operated by putting it into a loop with a single lamp to regulate the amount of current; but this is not customary. The way in which electricity for talking over a wire is generated depends on the transmitter used. If this be the Blake, or "variable contact," device, then some sort of an open circuit cell, probably a strong one like the Leclanche or the "bichromate," is commonly employed. This is inclosed in a box on the same board with the other fixtures. If, however, one has instead of the carbon transmitter a "magneto," either exactly like or working on the same principle as the receiving instrument (on which Bell's patent expired last January), no battery is required for conversation. Buyers of such outfits, though, should remember that in talking for more than a few hundred yards an extra strong magnet, instead of the ordinary one, is desirable in the transmitter. It will thus be seen that with some equipments a battery is used for the call-bell only; in others for conveying speech only. But with certain instruments a battery may be dispensed with altogether.

A word or two here about batteries. In certain kinds of work, like electroplating, the dissolution of substances in order to produce metals, or telegraphing, a continuous current is necessary; and nowadays, where such work is done on a large scale, it is found more advantageous to derive it from a dynamo than from a battery, which depends on the chemical action of one set of substances (generally in liquid form) upon another set. Still, batteries especially designed for such heavy work are yet in use, and these are known as closed-circuit batteries. In an open-circuit battery the destruction of acids upon the metal plates or rods, by which the current is produced, goes on only during the few seconds or minutes of actual service, while a button is being pushed or while an automatic switch is closed by taking down the 'phone from its hook. Hence different materials are used in such batteries, although they work on exactly the same principle as the others. A great variety of these are known to electricians, the metals and solutions and mechanical construction differing in detail. An important subdivision of such apparatus includes what are known as "dry" batteries, of which several are in the market. In these there is no fluid to slop over and make trouble in case of accident, the chemicals deriving whatever moisture they require from a paste or semi-solid filling, confined by hermetically sealing the jar containing it. Even intermittent service, such as open-circuit batteries are called on to perform, varies in frequency and degree, and for light work dry batteries, which are usually cheaper than wet ones, will often last for months or even a year, requiring absolutely no notice. The best open-circuit batteries of the other class, however, need but little care—filling up with water once a month perhaps, renewal of zinc or copper plate every two or three months, or some other trifling or inex-

pensive attention. Storage batteries, in which electricity already manufactured is accumulated, will of course do all the work; but it is necessary to send them out to be charged every now and then, and it is not always easy to arrange for this. Hence primary batteries are generally preferred to secondaries.

Batteries constructed especially for only occasional use, it must be remembered, are liable to lose in efficiency if drawn on continuously for half an hour or so, and require long intervals of rest to keep in good condition. This temporary paralysis is different from the final exhaustion or death of the apparatus, in its nature, but the possibility must be kept in mind.

How Far Can Electricity Be Carried?

The attempt to convey, in the form of electricity, power from Niagara on a large scale, over long distances, is exceptionally interesting, not merely because of the capacity of the cataract itself, but because in many ways it is a great experiment. Except for a certain exhibition plant, transmitting power from Lauffen to Frankfurt (Germany) in 1891 (100 miles), no practical work of this sort has been done for a greater distance than about 20 or 25 miles; and the Lauffen-Frankfurt venture could hardly be conducted cheaply enough to be a success commercially, although it was such from an engineering point of view. Hence a discussion of the possibilities of Niagara by two well known and presumably disinterested electricians, Edward J. Houston and E. A. Kennelly, in the *Electrical Engineer*, recently, deserves attention.

These experts at the outset slightly amend the estimate of Prof. Forbes, consulting engineer of the Cataract Construction Company, regarding the hydraulic works (intake, canal, wheelpit, turbines, power house and tailrace tunnel), so as to make the cost of one-horse power delivered by the wheels about \$3, or of one kilowatt \$4. Amperes (or volume) multiplied into volts (or pressure) gives watts, and .736 of these make a horse power. But electricians prefer to figure by thousand watts, or kilowatts, each of which is equal to 1.359-horse power. Calculations are here made on a basis of nearly 120,000-horse power, which the present works are expected to develop. Perhaps 110,000 is nearer the company's own estimate, though. It is also assumed that the voltage employed for transmission will be 50,000, as previously announced. Messrs. Houston and Kennelly next figure on the cost of dynamos or generators, transformers at both ends of the line, motors to convert the current back into power, necessary line (bare overhead wires being deemed safe), superintendence and operating expenses, besides allowing ten per cent for interest, depreciation and repairs. Another item is the loss of electricity in transmission, and to meet this they regard 1.174 kilowatts necessary at the turbine shaft at Niagara to enable the motor to deliver exactly one in Buffalo (15 miles away), 1.588 to give one in Syracuse (164 miles off), and 2.048 for one in Albany (330 miles distant). The only other variable factor is length, and hence cost of line, wire, poles and insulators.

The amount of power delivered in each place has to be considered, however, and in this computation it is assumed that Buffalo receives 22,500 kilowatts, Syracuse 7500, Schenectady 7500, Albany 15,000, and intermediate points 15,000, or 67,500 in all. This is equal to about 92,000-horse power, the net product of that 110,000-horse power plant. Now, if the full amount be delivered in each case, the estimated cost would be \$10.69 per kilowatt annually in Buffalo, \$17.22 in Syracuse and \$22.14 in Albany. But, as the average delivery would probably be only 60 per cent of the maximum load, the whole cost should be assessed on that proportion of power, making the corrected figures for a kilowatt \$17.82 a year for

Buffalo, \$28.70 for Syracuse, and \$36.90 for Albany. Averaging it up for all points, though, the rate is made \$16.72 for the maximum load and \$27.87 on the basis of a 60 per cent mean consumption. According to Emery's tables (widely accepted as a standard), steam generated in large amounts by coal costing \$3 a ton cost for 308 days a year and 10 hours a day \$33.88 per kilowatt annually, or for 365 days of 20 hours each \$59.56. But the majority of factories need power only about 10 hours a day. Messrs. Houston and Kennelly conclude, therefore, that "the power of Niagara Falls can be transmitted to a radius of 200 miles cheaper than it can be produced at any point within that range by steam engines of the most economical type, with coal at \$3 per ton; that Niagara power can maintain at Albany a large day and night output cheaper than steam engine at Albany can develop it; but that for power taken at Albany for ten hours per diem the best steam engines have somewhat the advantage over Niagara, unless exceptionally favorable conditions of load could be secured for Niagara power." They further remark, concerning the 200-mile limit, that "it might be commercially advantageous for such a large water power to undersell large steam powers at twice this distance with no profit, in order to reduce the general expense upon delivery nearer home."

Making Visible Lines of Electric Force.

Herr Bruno Kolbe thus describes an experiment for making visible lines of electric force: Into a flat cylindrical vessel pour anhydrous oil of turpentine to a depth of two cm., and add some sulphate of quinine. Attach to the rim of the vessel two wire spirals, adjusted so that the two small metallic balls at their ends dip into the turpentine. Stir the quinine with a glass rod so as to distribute it evenly, and place the vessel on a black cardboard. The two wires are then joined to the terminals of an influence machine and turned very slowly, and the white crystals group themselves at once so as to form beautiful curves, representing the "lines of electric force."—Invention, London.

Practical Information.

Spiders' Webs as Scientific Instruments

The astronomers of the Naval Observatory at Washington have sought all over the world for spiders' webs. Such gossamer filaments spun by industrious arachnids are utilized in telescopes for cross lines extended at right angles with each other across the field of view, so as to divide the latter into mathematical spaces. Threads of cobwebs are employed for the purpose because they are wonderfully strong for their exceeding fineness, and also for the reason that they are not affected by moisture or temperature, neither expanding nor contracting under any conditions. Specimens were obtained from China by the directors of the observatory, because it was imagined that the large spider of that country would perhaps produce a particularly excellent quality of web.

However, it was found that the best web is spun by spiders of the United States, such as found in the neighborhood of Washington. Accordingly, expeditions are made early in June each year to get from the fences and barns thereabout cocoons of the big "turtle back" spiders. Each cocoon is composed of a single silken filament wound round and round, though there are apt to be some breaks in it where Mistress Spider left off work for a time. Attempts have been made to use the cocoons of spiders like those of silkworms, and exquisite fabrics have been manufactured from them. Unfortunately, it was found impossible to make the industry a commercial success, owing to

the combative inclination of these creatures. When kept together they will always gobble each other up in a short time, the final result being a single very large and fat spider and one cocoon.—The Optician.

Curious Effect of Changing Time.

The introduction of Middle European standard time throughout Germany had the effect of reducing considerably the amount of gas and electricity used for lighting purposes. Throughout a great part of Germany the time was advanced from 10 to 30 minutes. As business hours are of course regulated by the standard time, business now, while closing nominally at the same time as ever, closes actually from 10 to 30 minutes earlier than before and as much gas as is consumed in that time is saved. This deficiency is not made up by business beginning earlier in the morning, because most business begins so late as to require the aid of artificial light in the morning for only a short period in the year. Restaurants and cafes that close at midnight save from 10 to 30 minutes of artificial light. The reduction of electricity for lighting consumed in Hannover is calculated to be eight per cent, representing a reduction in the income of the company of 2000 marks per year. Figures for gas are only given for two small cities, Kiel and Brochum, which report the reduction of gas consumed in the last year to be 103,000 and 100,000 cubic meters respectively.

Reducing Cost of Mining.

One of the ways by which the Tennessee Coal, Iron and Railroad Company economizes in mining is shown by the system employed at its Whitwell collieries, in Marion county, Tenn. The mines are situated on the side of Cumberland mountain. There are three openings in the face of the mountain, and the coal is brought by means of tram cars to the head of a double-track incline at the central opening and there dumped into bins. From the bins, trip-cars, carrying five tons each and running in pairs on both ends of the cable, are filled. The incline is nearly a mile long and is controlled by drums at the top with powerful hand brakes and automatic fan governors. The use of powder in the mines is largely avoided by undermining in the day and allowing the settling of the roof to loosen the coal during the night. The mines are drained by siphons, so arranged as to be primed by one man without stoppage. So completely has the force of gravity been utilized that there is not a steam boiler on the work. The output of the mines is about 1000 tons per day.

The Value of Brevity.

In conversation with one of the leading lawyers of this town the other evening, our talk drifted upon the enormous fees sometimes paid to the members of that profession, and he cited an instance where a lawyer received a large retainer for the composition of only three words. Every one is familiar with the famous sign of the Reading railroad, "Stop, look and listen," which is placed on grade crossings along its lines, but comparatively few know the real significance of these few brief words. The rule of the roads, from a legal standpoint, is that a teamster or driver must stop, look and listen for an approaching train. Previous to the adoption of this sign the company used these words, "Beware of the engine and cars," followed by a series of injunctions that no man walking would have patience to read. There were several accidents which brought the company into court, and the opposing counsel claimed that these signs were not clear warning. McLeod went to Judge Paxson, who wrote the admirable sign now in use by that company, "Railroad crossing; stop, look and listen," receiving for this modest composition the sum of \$4780, a

trifle over \$796.66 a word. It can fairly lay claim to being the most expensive composition on record, and shows very forcibly the value of brevity.—Shenandoah Herald.

Sky Scrapers in Chicago.

It is a fact well known to the builders of the tall buildings called "sky scrapers" in Chicago that there is a constant and uneven motion going on throughout the whole structure, called by some molecular vibration, to an extent which can be measured with the naked eye. Girders will move an inch or more, and then come back into place. The causes of this movement are as yet entirely unknown, as are their extent and duration. Another peril which menaces this class of building is oxidation. The steel frames are inclosed in fire-proofing and beyond the reach of examination or the application of preservatives. The disintegration may be slow, but the day must come, so say good authorities, when the great buildings must succumb to rust and ruin.

FOREIGN PAPERS say that about 18,000,000 taels, or \$15,000,000, have been collected in China for the celebration of the sixtieth anniversary of the birth of the Dowager Empress of that country. This sum, however, is not considered sufficient, and efforts will be made to collect \$10,000,000 more. The celebration will be one of the most elaborate ever held in the Flowery Kingdom. The Dowager Empress is looked upon as the cleverest woman in China, and the virtual ruler of the country, as her son consults her upon every important question. He makes stated pilgrimages to the castle in which she lives to discuss public affairs with her.

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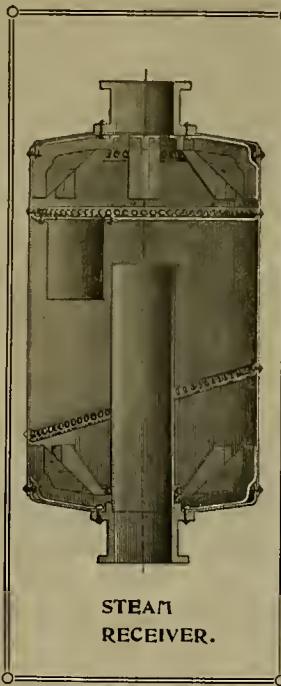
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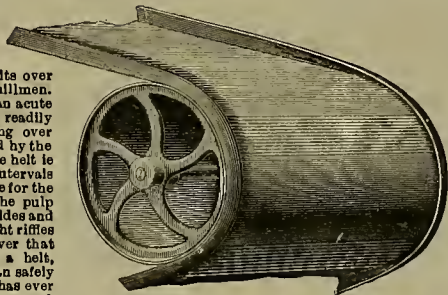
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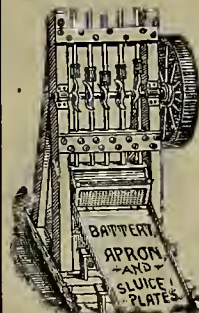
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Installation of Electric Wires.

The number of casualties through the defective installation of electric wires are causing the insurance companies to make new conditions. The Hartford local board of five underwriters have issued the following instructions to those using electric lights:

All switches with wood or fibre bases to be placed with switches with porcelain or slate bases.

All flexible cords run on ceilings or wall must be removed.

Not more than one flexible cord must be taken from each rosette.

All lighting or power meters must have a slate back, or be placed on insulators so that the back of meter will be at least one and one-half inches from any inflammable material, and, when possible, meters should be placed on brick walls.

All direct current meters shall be wired with a one-half ampere fuse with the resistance and armature. This will prevent the resistance from becoming overheated when power wires are crossed with high tension currents.

All resistance boxes or rheostats must be equipped with metal or other non-combustible frames.

All fuses must have metal tips, having perfect electrical connection with the fusible part of the strip.

One Side of It.

There are more than 300,000 men employed in bituminous coal mining, most of whom are now on strike. They earn usually \$100,000,000, which is 68 per cent of the value of the coal at the mines. The mining companies have not been making any money lately, because so many mills and factories were closed that it has restricted the market for coal. The reduction of miners' wages was a shrewd move on the part of the companies. The managers expected that it would produce a strike. This was just what they wanted, in order to lessen production of coal and clear off surplus stocks. As soon as this is done the strike will end, and everybody will pay a little higher price for coal than he would if competition continued without restriction.—American Manufacturer.

The latest application of electricity is to

the business of starting horses in a running race. An Atlanta, Ga., man has invented an appliance for this purpose which runs on two rails, on either side of the path for the horses, and is joined by a rope across the race track breast high to the horses. It moves forward as the horses do, and by the pulling of a cord the rope separates in the middle and flies upward on two arms and the field is off. The starter sits on a platform on the inner side of the track, and moves with the field until he lets them go. If the thing works, it will be a great time-saver and largely do away with those tedious waits with which patrons of the turf are only too familiar.

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ADOPTED, USED AND IN FORCE IN ACCORDANCE WITH STATE LAW.

FOR THE CONVENIENCE OF OUR READERS IN THE MINING COUNTIES WE PRINT IN LEGAL SIZE, 12x36 INCHES, THE MINE BELL SIGNALS AND RULES provided for in the Voorhies Act, passed by the State Legislature and approved March 3, 1893. The law is entitled "An Act to Establish a Uniform System of Mine Bell Signals to Be Used in All Mines Operated in the State of California, for the Protection of Miners." We can furnish these Signals and Rules, printed on cloth, so as to withstand dampness, for 50 cents a copy. MINING AND SCIENTIFIC PRESS, 220 Market St., San Francisco.

Mining Summary.

The following is mostly condensed from journals published in the interior, in proximity to the mines mentioned.

CALIFORNIA.

Butte.

A BIG QUARTZ LEDGE.—*New Era*: A quartz ledge of an unusual exposed length has been discovered about three miles from Forbestown, and five locations of 1500 feet each have been made. The ledge is situated in parts of four sections, viz: 27, 28, 34 and 35, Township 20 N., Range 6 E. The ledge is wide and well defined and is said to prospect well.

The croppings in many places are 20 feet above the level of the ground. The exact width of the ledge is not yet known, but in some places where the croppings are broken down a width of 60 feet is shown. Several of the locators are doing development work upon their claims, and several assays of the ore have been made, showing an average of about \$20 to the ton. The ledge lies in such a position that each location can be worked by tunnels at a considerable depth, and good water power can be obtained from Sucker Run. Many of the locators are men of means, and we may expect to see the ledge fully prospected this summer, and, if possible, that a mill will be built by some of the locators this fall.

The ledge is without doubt the widest in the State. Messrs. Price & Co. have a shaft on their location down 30 feet, and are taking out some fine rock.

Although the ore is not high grade, its immense body makes the ledge valuable. It is not claimed that the rock is the richest, but its abundance and the ease and cheapness in which it can be mined and worked will make it very profitable.

Nevada.

Herald: The mill at the German mine, Washington, started up Saturday morning. Superintendent Goss has everything in good shape now, and will work the mine to its fullest capacity. The sawmill up at the Oak Tree (Eagle Bird) is running full blast, getting out timbers and lumber for the new mill and other buildings. The Oak Tree is grading for a new mill about twice as large as the present mill, and additional concentrators and other new machinery will be put in and the plant enlarged all around. This is probably the most important work now going on in the district. Superintendent Garland of the Rainbow is also preparing to put up a mill. The mine has none at present. The Rainbow is turning out well, and a mill of its own is now a necessity. So it will be put up this summer.

Shasta.

ALTOONA DEVELOPMENTS.—*Democrat*: Superintendent Cox, of the Altoona Quicksilver Mining Company was here Sunday and Monday with a company of 18 people—eight families—en route for the company quicksilver mine, 20 miles west of Castella. The men of the company are all experienced quicksilver miners, and go to work on the mine. They were fitted out with every means of comfort, and even had a brass band and orchestra with them.

The Altoona Company are making extensive developments on their property. Holt & Gregg have been given the contract to burn the brick and build the new boilers and furnaces, and Jim Holt leaves next Sunday morning with a crew of men to begin work. Gerald O'Shea has the contract for putting in all the freight for the company. The freight will all be shipped to Redding and from here hauled by team to the mine.

The company will shortly double the capacity of their works at Altoona and begin on a gigantic scale.

The Altoona is one of the oldest and most productive quicksilver mines in the State, and the new company intends to make it the largest producer in the country.

Development work on the Bully Hill mines at Copper City is progressing rapidly and with good results. Superintendent George Fitch has a force of five men at work at Bully Hill pushing through the tunnel, and it is expected they will uncover the ledge in a few days. The ledge is known to be there, as it was discovered many years ago, but was caved in on and lost.

Sierra.

SIERRA CITY MINES.—*Messenger*: The Bonanza gold mines will be running full blast as soon as the tramway is finished. They have two big ledges with a pay chute on both, and the mine will doubtless soon declare dividends to its stockholders. It will help out Sierra county immensely.

In the Chips mine a good pay chute has been discovered, and before long this mine will add its strength to Sierra's bullion-producers.

The Phoenix mine will soon change hands. The liens will all be paid off and the whole mine thoroughly prospected. An expert was up the other day to examine this mine for a San Francisco company which will doubtless take hold of it.

The Saddle Back mine, situated between the Buttes peaks, is another promising piece of property. A wagon road to the millsite is almost completed. This mine will be worked by connecting the mine and mill with a tramway over 6000 feet in length.

The old Martini mine, bonded by Oliver Sunderhans, has been working eight men all winter. The rock has been very hard all the way with the exception of probably fifty feet. There are two chances in this place—one for gravel and one for quartz. About forty years ago a company of Mexicans ran arrastras on the flat rock which was very rich.

Wm. Edwards, formerly foreman of the Sierra Buttes mine, is in town this week. It is

rumored that he is backed by London capital and is looking toward the Keystone mine.

Madera.

GAUS GULCH MINES.—*Mercury*: Charles M. Ward, the mining expert and superintendent of the Mammoth mine at Grub Gulch, stated that mining matters in the Gulch are booming. The Mammoth mine is working with a full complement of hands and getting out good paying ore. The shaft is now down 300 feet and there are 1400 feet of drifts. The ore runs from \$6 to \$6000 per ton. The mine is lighted and worked by electricity.

The Starlit mine, which was sold by Mr. Ward to San Francisco capitalists, is being developed rapidly. It is down 320 feet already and a great body of rich ore is in sight. It is the intention of the owners to fully develop the mine before beginning milling operations.

The Spencer mine is a good paying property and is being worked by the latest improved machinery. A ten-stamp mill is being run with profit to its owner.

Mariposa.

ON THE VERGE OF A BOOM.—*Gazette*: Hornitos appears to be on the verge of a mining boom. One day last week just after a heavy rain, a prospector went out to search for gold in the old placer dirt near the village, and before night he had cleaned up \$160, in ground that had been worked over many times. This was fair pay for one day's work, and shows conclusively that the mines are by no means exhausted. During the same week three men were prospecting near Muller's, six miles from Hornitos, when they came across a find of gold which gave them \$250. They found some gold in dirt which had been thrown out of a hole dug by a squirrel, and digging down found the nuggets, some of which weighed \$2.50. Mr. Muller thinks the gold had been buried there by some one long ago. This may be the correct theory, but all the country around Hornitos has always been gold producing. Less than three years ago the writer saw a piece of obsidian, as large as a man's head, picked up in that immediate vicinity, which was thickly veined with gold and which yielded almost an ounce of the precious metal. It will pay to examine squirrel holes and bits of obsidian down there.

Tuolumne.

GENERAL MINING NOTES.—*Independent*: The Laura and North Star mines located on the Enreka vein at Cherokee. The shaft is down 400 feet. The drift to the south intersects a three-foot vein, and shows well in sulphurets of high grade.

The Rawhide mine is now running steadily. The water is subdued and the mill is pounding away on their usual rich ore.

The Rappahannock mine, north, adjoining the Rawhide, is in operation. A shaft is being sunk about 500 feet from the south boundary, with the view of determining the value of the lode in that portion of the property. The old south shaft, now under water, contains a rich shoot of ore, which will be reopened in the near future, when the owners determine what power they will adopt—water or steam.

Col. Jack Coles is operating the Worcester mine, which is situated to the south of Summerville, and is a parallel vein to Eureka. The vein is four feet wide and shows gold freely in the rock, which also carries high-grade sulphurets of heavy percentage. The colonel has of late been pumping the water out of the shaft, which being now successfully accomplished with the aid of steam power, has commenced to drift north and south to develop his property.

The Seminole mill has just been completed with ten stamps, and is running. The vein is fully four feet wide, free gold being seen in the rock daily. There are over 500 tons of ore on the dump, ready for crushing. The ore shoot is found to be 200 feet long. Twelve men are employed in the mine. The power used is water from the Dead Horse ditch.

The Red Haw is a newly-discovered mine, situated between the Young America and New Albany. It is a parallel vein to the Seminole, from one to four feet. So far, fifty feet of shoot is opened up. Rock will pay \$10 per ton.

ARIZONA.

GENERAL NOTES.—*Journal Miner*: There seems to be a general move being made to Hassayampa section among miners. Another instance where history is repeating itself.

Several dry-washing miners are working in Rudy gulch, near Copper Basin, and are making good wages from the gravel there. From six wheelbarrows of dirt two men recently obtained \$5.50 in the yellow metal, so a report says recently.

The Gladiator mill is running on half time, owing to a scarcity of water. The company is endeavoring to secure a permanent supply in a near locality, and thus permit of steady running. The mine is looking better than ever.

A steam shovel is now being talked of for use in the Black Canyon gold fields. San Francisco and New York capitalists are behind the enterprise, and are now energetically pushing the matter to an active state in practical mining. Mr. W. D. Church, one of the original promoters of the scheme, and who will act as the general manager of the company, will leave tomorrow, in company with two experts, representing respectively the Eastern and Western stockholders, for the scene of future operations.

The Valencia mine in Black Canyon district, about four miles from Bumblebee station, was bonded last evening by Messrs. Dodson & McPhee to Denver parties, the consideration being \$12,500 in cash with other agreements. Improvements are to be placed upon the property. A five-stamp mill is at present located upon the mine, while five additional stamps are en route. The mine is an old one and has a shaft 90 feet deep with a 36-inch vein of free gold ore at the bottom. The new operators of the mine

intend to thoroughly work their recent purchase and feel confident of making a success of it.

Encouraging news has been received concerning the mines in the Francis district, 45 miles north of this city, during the week just past. Mr. P. Johnson returned from Rain Tank with the information that the two men sent out by a company of Williams citizens have discovered a well-defined ledge which promises to eclipse anything yet uncovered. Samples of the ore are now en route to the Selby Smelting Company, San Francisco, and it is expected that when the returns are received, a general stampede will occur.

Mark Bradley made a very rich strike of gold sulphuret ore on Slate creek last week. The ground has never been located heretofore. The ledge is two feet wide and the ore goes \$250 per ton in gold. It is fine concentrating ore, and gives good promise of developing into a good claim.

In a short time the famous Vulture mine may once more resume its ancient activity. Hon. Thomas Farish's lease on it expired yesterday. He has made money by running only ten of the eighty stamps and using the water in the mine. This morning, W. L. Cooper, one of Senator Tabor's trusted mining lieutenants, leaves for the property, and will await his chief and the latter's brother-in-law, Peter McCourt. The chief improvement needed is ten or twelve miles of water piping from the Hassayampa, which was carried away by the great Walnut Grove flood.

Mr. Burns, who recently discovered in Peoples canyon what was supposed by many to be the Nigger Ben mine, is giving his new bonanza a thorough prospecting, and is being rewarded handsomely for his good luck in the discovery of the property. The ledge prospects well for 30 feet across, being a deposit, while a one-foot streak was run into a few days ago which goes so high that the owner is sacking the ore from it for shipment to Prescott as soon as means of transportation can be afforded.

ALASKA.

Juneau News. F. D. Nowell, general manager of the Berners Bay Mining & Milling Co., brought down with him from the Comet mine yesterday a small sack of ore, taken from a four-foot ledge in tunnel No. 2. It is some of the richest free-milling gold quartz ever brought here from the mine, and its richness and fine appearance is the talk of the miners about town. It is white quartz, mineral stained, with free gold shining from the surface and permeating its texture. The management is highly elated over the splendid showing in the mine. On Tuesday the men in the crosscut holed and made connections with the winze from the upper workings, striking the winze almost squarely. An ore chute and manway will be put in the winze, and all the ore will pass through from tunnel No. 2 into the crosscut, and thence out to the surface and station of the tramway. The crosscut is 700 feet long, and for several weeks a hand blower had to be run to furnish air to the gang of men, as it became stagnant and bad. The mill is ready to drop stamps on ore from the bin, and all that is wanted to unhang the stamps and let them drop is water.

BRITISH COLUMBIA.

BACK FROM BIO BEND.—*Nelson Tribune*: William Hennessy and M. H. Hubbard returned from a trip to the Big Bend country on Tuesday. They report it useless for prospectors to go into that section earlier than July 1st, as the snow is yet very deep in the mountains. The Consolation claim on French creek is paying well. The pay gravel is not more than six inches, but the bedrock is worked to a depth of 2½ feet, it being coarse slate. The face is about 30 feet in width, and the dirt is run some 600 feet and hoisted 50 feet to the surface. It will, however, soon be hoisted through another shaft nearer the face, and a considerable saving will be made in labor. The dirt pays about \$30 to the yard, and the dust is worth \$18.75 an ounce in San Francisco. Several claims will be worked on McCulloch creek. Mr. Hennessy and Thomas Lidster have both become interested in claims on that creek. A party is at work on ground four miles from the mouth of Carnes creek, and reported taking out good pay. The quartz ledges in the Big Bend are from 15 to 20 inches wide, and it is claimed the ore runs from \$30 to \$50 in gold to the ton. John Boyd has bonded a claim located about 10 miles up Carnes creek, and is now cutting a trail to it. The vein is said to be nine feet wide, and in slate, granite and porphyry. The ore runs from \$10 to \$40 in gold.

MANITOBA.

A BIO STORY.—An immense body of auriferous ore a mile wide by two long is reported to have been discovered between Rat Portage and Fort Arthur, 70 miles south of the Canadian Pacific railway. Assays average \$3 in gold and \$4 in silver. Geologists have expressed the opinion that the deposits may be from 8000 to 10,000 feet deep.

MONTANA.

THE ELKHORN.—The Elkhorn mine has sunk another lift to the 1600-foot level and crosscut 800 feet south, striking a very rich body of ore. Parties who have seen it declare that it is larger than any ever encountered in the Elkhorn. It is of a free-milling character, with very little base. The company has now an ore reserve sufficient to last three years without further development. Between 135 and 140 men are on the payroll. There is a 30-stamp mill, in which most of the ore is worked. The base, which amounts to about a carload a week, is sent to the East Helena smelter for reduction. The ore reserves run all the way from the bottom to the top. The poorer quality of the ore is not taken out and will remain until there is an upward movement in the price of silver. The fire escapes in the mine are poor and there

is no fire department. The ventilation of the underground workings is perfect. No square sets are used and stulls are procured from the surrounding hills with which to do the timbering. The old stopes are filled in with waste from the ores, which are carefully sorted before being hoisted. Miners receive \$3.50 per day and muckers \$3. All the topmen, with the exception of the mechanics and those employed on expert work, receive the same rate.

CATAACT DISTRICT.—*Basin Times*: The Eva May mine.—The shaft is a two-compartment one and is 350 feet in depth. There are three levels, at the 100, 200 and 300, respectively. The 100 connects with a drain tunnel run in on the lead from the bed of the creek, entirely on ore, and this portion of the mine has been extensively developed, as there is a large quantity of ore at the month of the tunnel that came from these workings. On the 200 there is a small station which crosses the lead. On this level the face is in 30 feet of first-class ore and there is a winze 75 feet deep 50 feet from the station in ore which will assay not less than \$100 per ton. At the bottom of the winze drifts have been extended east and west in fine bodies of ore, and half a dozen candles must be kept burning to make any light at all, owing to the black ore that prevails on every hand. On the 350 drifting continues east and west. On this level the lead is 90 feet wide, with 30 feet of fine concentrating ore. The lead is cross-cut to the hanging wall and in no place is it less than 90 feet wide. The character of the ore in this lead is the same as in all the Cataract country; while there are some extraordinarily rich bunches, the average of the lead is also very rich.

UPPER BASIN CREEK.—S. H. Haggerty, from Upper Basin creek, reports that the snow is all gone. On the 21st of April it was four feet deep on a level. The snow that remains in the mountains is melting so rapidly that it is feared the placer miners will not have as long a season as was expected.

The Winters Brothers and Brown and one man are working with a monitor on a six-foot bank of gravel that goes 25 cents to the pan. They expect to take out not less than \$10,000 this season.

The Robert Burns attempted to sink three winzes this week, but the water came in so fast that work had to be stopped. The ore is very fine, containing gold, silver and copper. A quantity was shipped from the tunnel level and paid handsomely. This property is 10 miles up Basin creek in an undeveloped country.

NORTH CAROLINA.

ONLY A LITTLE GOLD.—*Butte Miner*: George W. O'Dell returned a short time ago from Monroe, N. C., the reputed gold fields about which the newspapers of the South have had so much to say lately. He represented a Butte company which contemplated the purchase of a big body of placer ground in case it proved as good as reported. He found gold, but the metal was too fine and not in paying quantities; and even if there had been gold in abundance there was not sufficient fall to mine it without entailing an enormous expense, as water would have to be flumed a great distance. Two young men had taken up most of the ground and were working negroes at 50 cents per day, but even at that low rate were obliged to suspend operations on account of the meagre returns. The men have had an idea that they had discovered another Alder gulch, and anticipated accumulating immense fortunes. Mr. O'Dell also visited the quartz mines of Charlotte, N. C., upon which operations were suspended nearly 70 years ago, and of which he formed a very favorable opinion.

SOUTH DAKOTA.

MORE CYANIDE WORKS.—*Deadwood Pioneer*: A brick weighing \$6300 came up from the Cyanide works yesterday. This represents a two weeks' run and the saving of the assay value of the ore of 90½ per cent. Doctor Taylor, who has just returned from St. Louis, says that the cyanide plants at Deadwood and Pluma are not the only ones that will soon be running in the Hills; that he had parties coming here from St. Louis who would be in the country by the 1st of July, and who were prepared to back up the building of cyanide plants. The returns from the ore of the Big Bonanza mine make it more than ever apparent that the cyanide process as a gold-saver is in the ascendant, and that it is the coming mill will be proved as time goes on. Doctor Taylor is enthusiastic, and he has the past test runs of the Deadwood works to bear him out in all that he claims, viz., cheapness and saving a higher percentage of the assay value than any other process here in the Hills.

UTAH.

FROM POVERTY TO WEALTH.—*Salina Press*: A large body of ore was opened up in the Carrie mine, on the Baldy mountain, last Saturday, and a streak in the center of the vein about a foot wide, which will run from \$500 to \$800 per ton in gold and silver—mostly gold—was discovered. It is estimated that \$1000 worth of ore was knocked in one shot that day. The mine is owned largely by the Butler Bros. of this city, who have been working and half starving themselves the past two or three years to open up the property. They first run in a tunnel, which crossed the vein near the top, and last winter they started another tunnel about 60 feet lower down; with this they tapped the vein with the above result. They had been running along in talc for about ten feet beside the vein without knowing it. The present opening shows a large body of rich ore, besides much of a lower grade. This strike promises to make the Butlers the wealthiest people in this part of the country, and they can be congratulated on their energy and pluck. The Butlers are awful good people now, but it has been a grave

question when they were going to get the next sack of flour last winter.

WASHINGTON.

A CHEERFUL VIEW.—Loomiston Journal: The Similkameen river has been on a tremendous rampage for ten days past, and has marked the highest in years. Considerable damage has been done by the raging waters, but there is one feature not to be overlooked, and that is that the immense flood has torn up to a great extent all the old bars and washed up great quantities of placer gold from the bed of the stream and placed it where the ever-ready miner will be able to get and redeem it from its resting places of ages. Ten thousand men working a year could not have so turned over and rearranged this sand and gravel of the Similkameen, and the knowing ones who are here are already outfitting and getting ready to go to work as soon as the waters subside. Another thing in favor of the placer miner is that the bulk of snow tributary to this river will have gone off during the recent warm spell and the river will fall much lower when it does fall than for many years past. Taken altogether, there has nothing happened for years in this placer mining business of as much benefit as this recent high water in the Similkameen.

Coast Industrial Notes.

—The Risdon Iron Works are building a plant for the Gwin mine, in Amador.

—The Skagit Boom and Lumber Company of Tacoma has incorporated, with a capital stock of \$25,000.

—The Northwestern Milling and Power Company of Spokane has incorporated, with a capital stock of \$750,000, to construct and operate mills of all kinds.

—The Cass-Camp Pile Preserving Company has incorporated, with a capital stock of \$100,000, to deal in patent rights for preserving piles and to take contracts for preserving piles and timber.

—W. E. Baines, of Marshfield, Or., intends to construct a log raft and tow it here. Captain Robertson, who contrived the Leary cigar-shaped raft on the Atlantic coast, is interested in the enterprise.

—The opening of the Mendocino county coal fields means much for the manufacturing industries of the coast, if, as it is claimed, the coal can be mined for \$1 a ton and laid down here for another dollar.

—From January 1 to June 1, '94, the shipments of shingles and lumber from Seattle, Wash., via the Northern Pacific railway were 2681 and 67 car loads respectively. For the first five months of '93 they were 2836 and 396.

—The \$20,365.38, the unexpended money of the California appropriation for her exhibit at the World's Columbian Exposition, has been paid over to the State Treasurer by Irving M. Scott, president of the California World's Fair commission.

—Hallibut weighing 30 and 40 pounds were sold at the Tacoma water front last week for 25 cents each. The fish belonged to the North Pacific Fish Company. On account of the floods they could not be shipped east, as is usual, and it was a case of selling them at what they would bring or letting them spoil.

—The Oriental Gas Engine Works, 105 Beale street, this city, has just completed a marine engine of 30-horse power, new design. It will be placed in a new freight boat belonging to Lynde & Hough for service on the bay. These works are also turning out a new pattern of horizontal gas engine for general purposes.

—A syndicate of San Franciscans are arranging to systematically work a big placer bank on Salmon river, a tributary of the Yukon. They will purchase a steamer on Puget Sound to carry the mining machinery to the placer bank, which is reported to be over a mile long and is said to contain several million dollar's worth of gold.

—E. G. Denniston, proprietor San Francisco Plating Works, 653 and 655 Mission street, has a large exhibit of silver-plated copper mining plates in quartz and placer mining at the fair that has attracted considerable attention. They contain over 400 square feet of surface, and are believed to be the largest ever made. He has five exhibits, four in the Mechanic Arts building and one in the quartz mill building. He has presented the State Mining Association with \$100 in coin and a \$150 silver-plated copper mining plate for saving gold.

Hernia.

Attention is directed to the advertisement of Dr. J. C. Anthony in another column. Though a graduated physician, Dr. Anthony makes the treatment of rupture a specialty. His method is scientific, and the great success with which he has treated some of the most difficult cases, effecting complete cures, has given him a high, wide-spread and well-deserved reputation. Those who are afflicted will do well to call upon or correspond with him, at Room 87, Chronicle Building, this city.

Patents Issued to Pacific Coast Inventors.

Reported by Dewey & Co., Pioneer Patent Solicitors for Pacific Coast, 220 Market St., S. F.

FOR THE WEEK ENDING JUNE 12, 1894.

521,228.—MUSICAL INSTRUMENT.—C. L. G. Bech, Bellevue, Wash.
521,201.—LAMP STOVE.—F. E. Browne, Los Angeles, Cal.
521,260.—ELECTRICAL BATTERY.—Duhero & Mohrdeck, S. F.
521,262.—CAR COUPLING.—J. D. Gooley, Portland, Gr.
521,414.—BEVEL.—J. L. Langlate, Berkeley, Cal.
512,378.—ANIMAL TRAP.—Loomis & Hartle, Watsonville, Cal.
521,233.—DETACHING BLOCK.—G. W. Moore, Gardner, Gr.
521,272.—CULTIVATOR.—J. Schumann, Anaheim, Cal.
521,297.—PLANNER FEED ROLL.—J. D. Sigler, S. F.
521,422.—TELEPHONE CALL RECORDER.—W. F. Smith, S. F.

NOTE.—Copies of U. S. and Foreign patents furnished by Dewey & Co. in the shortest time possible (by mail for telegraphic order). American and Foreign patents obtained, and general patent business for Pacific Coast Inventors transacted with perfect security, at reasonable rates, and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey & Co.'s SOLICITORS PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

CURB AND PAVEMENT.—No. 520,220. May 22, 1894. Patrick W. Reardon, Oakland, Cal. The object of this invention is to provide a suitable curb or wall for pavements, whether sidewalks or streets, of that class in which various forms of asphaltum or bitumen are used. This curb consists of an exterior body with an interior core, the body being made of asphaltum composition of suitable character, and the core may be made of some hard material like wood or metal. It may be made in several pieces, with suitable means for connecting these together. The core pieces are placed in the mold, and the exterior body is formed around them so as to unite the whole in a solid single body. The curb thus made resembles the body of the walk or pavement and the core gives it sufficient strength to retain its shape and resist injury.

SULKY PLOW AXLE.—William B. Morris, Collinsville, Cal., assignor to E. I. Upham and William Emington. No. 520,934. Dated June 5, 1894. This invention relates to improvements in axles for sulky plows. It consists of a short independent axle pivoted to the main axle, and a means for tilting it about its pivot point so as to change the axle in a vertical plane, and thereby incline the wheel to any desired degree from a perpendicular so that the tendency to move away from the line when plows are used upon a side hill will be counteracted, and the plow will be held to the land and caused to run approximately upon the same level. The pivoting and locking mechanism enables the operator to adjust this axle and its wheel to any desired angle to suit the slope of the land upon which the work is being done.

DETACHING PULLEY BLOCK.—No. 521,293. June 12, 1894. Gladius W. Moore, Gardner, Oregon. This invention relates to detaching or latch blocks in which the keeper is hinged to the stock, and is held in place by a swinging link. The object of the invention is to provide such a block with an accurate slide fitting and applicable to any use requiring the detaching of a rope or chain from any fastening to which it may be secured, as, for example, in hauling or logging operations, in which its employment obviates the necessity of slacking or backing the team as is necessary to unhook common chains from their fastenings. It consists of a stock having separated ears at one extremity, a terminal bearing at the other end, and an intervening uprising tongue on the inner edge, the keeper having the tenon fitted and pivoted between the ears of the stock and resting, when closed, upon the tongue and terminal bearing of said stock, thus forming a bed for the detaching link, and a locking clevis to hold the keeper to the stock. Upon the binged pintle of the stock and keeper are axially turnable disks having the peripheries exposed to the link bed, so that the link is directed clear of the binged and block as the keeper is thrown back.

ELECTRIC BATTERY.—Fred Dubero and Peter Mohrdeck, San Francisco. No. 521,260. Dated June 12, 1894. The object of this invention is to provide a continuous or constant battery, the elements of which are recharged during the operation of the battery, and in the employment in conjunction with said battery of sea water as an active energizing element. It consists of containing tank, an interior positive element suspended within the tank having a connection for the positive wire, a negative element consisting of a revoluble hollow cylinder with a filling of negative material, and perforations through which the exciting fluid may reach the material when submerged and be drained from it when raised out of the liquid by the rotation of the negative element, and in conjunction therewith of a means for supplying sea water, which is introduced near the bottom of the containing tank and discharged at a point near the top.

MUD AND OIL TRAP AND WATER PURIFIER.—George F. Day and William Hunter, S. F. No. 520,670. Dated May 29, 1894. The object of this invention is to provide an apparatus for heating and purifying water; for withdrawing the mud or sediment which is deposited in the water, and in conjunction therewith providing an oil trap and means for withdrawing the oil which constantly accumulates from the engine and which, if allowed to pass into the boiler, produces foaming and other objectionable action. The apparatus consists of a vertically disposed chamber having transverse partitions dividing it into compartments. Water is received into the upper compartment, and flowing over shelves which distribute it into thin sheets, it is exposed to the action of exhaust steam which passes through the chamber and heats the water to such a point that lime and similar impurities will be deposited by the well-known action of heat upon water containing them. The water then flows from this chamber to a chamber at the bottom through a connecting pipe, which chamber is conical in shape

and allows the mud and sediment to settle to the bottom, where it can be drawn off from time to time by a cock and pipe opening out from the bottom of the cone. This conical form also serves, when the cock is opened, to draw down, as in a funnel, any oil or light material which may collect upon the surface of this water. Above this chamber are one or more chambers containing any material which serves to arrest such sedimentary deposit as may still remain in the water, the water flowing up through the perforated partitions which separate these chambers from the lower one and from each other. Above these chambers and below the first chamber into which the water is received, is an intermediate chamber for the purified water, from which it is drawn from time to time as needed in the boiler or for other purpose.

PLANNER FEED ROLLS.—John D. Sigler, San Francisco. No. 521,297. Dated June 12, 1894. The object of this invention is to provide a rigid sectional feed roll, the different sections of which will adapt themselves to strips of varying thickness which may be passed through the planer, and which, by reason of having their lower surfaces resting upon the bed of the planer, will have the upper surfaces of irregular heights. The rolls will adjust themselves automatically to the irregular thickness of the strips to be planed, and at the same time are held in position to engage the driving gears. It consists of the independent rigid cylindrical sections provided with internal bores, cylindrical sleeves within said bores having approximately the same length as the sections, having their lower ends open, and a shaft fitting into the channels in the lower part of said sleeves which allows them and the sections to rise and fall independently. There is a connection between the shaft and each section to guide the vertical movement of the section and prevent its moving endwise.

METALLIC PISTON ROD PACKING AND GLAND.—Charles H. Eosigo, Kekaha, Kauai, H. I. No. 520,954. Dated June 5, 1894. The object of this invention is to provide a metallic packing for reciprocating piston and other rods in which the packing rings are fitted into and enclosed within the removable gland of the stuffing-box, with means for adjustment. The gland has inner and outer chambers and an intermediate annular flange, the gland nut fitting within the outer chamber, and the packing rings, which are less than the diameter of the inner chamber, are seated therein so that a surrounding steam space is formed. One of the rings has its end projecting and an elastic ring surrounds the packing rings, holding them in place when not under steam pressure. The outer end of the inner chamber is closed by a cap bearing against the extension of the ring so that the two ends of the rings are held to form a steam-tight joint.

RUPTURE.

It has been considered by the medical profession that hernia—commonly called rupture—was incurable, except by surgical operation, which is both dangerous to life and very rarely ever successful. But Dr. J. C. Anthony of 86 & 87 Chronicle Building, has opened a new field for research, and for the past year has been making some remarkable cures. He causes the patient no pain and those living near enough do not lose any time only while in his office once or twice weekly. He guarantees every case he treats and does not ask a man for a dollar unless he cures him so there can be no chance of any one being cheated. The doctor is a graduate of Bellevue Hospital Medical College, of New York City.

HEALD'S

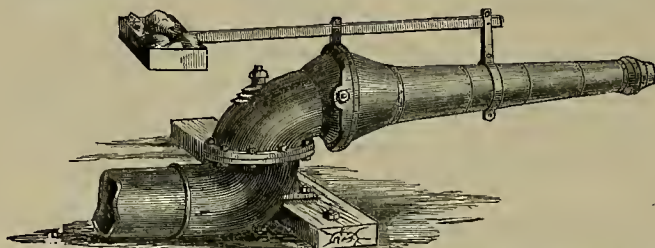
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FOR SEVENTY-FIVE DOLLARS

This College instructs in Shorthand, Type-Writing, Book-keeping, Telegraphy, Penmanship, Drawing, all the English branches, and everything pertaining to business, for full six months. We have sixteen teachers and give individual instruction to all our pupils. Our school has its graduates in every part of the State. SEND FOR CIRCULAR. E. P. HEALD, Pres., O. S. HALEY, Sec.

IMPROVED FORM OF HYDRAULIC GIANTS.



THE ABOVE CUT ILLUSTRATES THE IMPROVED FORM OF DOUBLE-JOINTED HYDRAULIC GIANTS which we manufacture, and which are pronounced far superior to the SINGLE-JOINTED style. The latter, however, we furnish when requested. Prices, discounts and Catalogues of our specialties of Hydraulic Mining Machinery sent upon application.

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DYNAMITE AND BLASTING POWDERS.

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Directors:

C. S. BENEDICT, ALVINZA HAYWARD, JGS. KNOWLAND, JOHN S. DOE, ED. G. LUKENS (President).



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Cams, Tappets, Bosses, Roll Shells and Crusher Plates.

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Special attention given to the purchase of Mine and Mill supplies.



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DOUBLE ACTING CORNISH PLUNGER.

PUMPS TWICE AS MUCH WATER AS THE OLD PLUNGER. Only about one-third the weight of the old plunger. Special construction of steel for packing on mules, only one-twelfth the weight of the ordinary plunger. First outlay one-third less, works with 10 per cent less power.

IMPROVED SINKING PUMP.—Bucket and clack changed under water. Bucket lasts six times as long as the old one, saving expense of putting down another pump where bucket and clack cannot be changed under water. The self-lightening and self-lubricating stuffing box and new bucket also saves expense of dropping extra pumps.

WM. NANGE, Grass Valley, Nevada County, California.

Market Reports.

The Markets.

SAN FRANCISCO, June 21, 1894.

The advance and recession in the price of silver during the week left it at practically the prices of seven days ago. In copper a sale is reported of 20,000,000 pounds by the Calumet & Hecla at nine cents for delivery by Nov. 1st. The reduction in the duty in quicksilver from ten to seven cents a pound is interpreted to mean a reduction of three cents a pound, or \$2.30 a flask. Regarding the rescuing of quicksilver from the free list, the *Call* of this city, in the current issue, says:

The quicksilver miners of California leaned back in their chairs with a sigh of relief and mopped the sweat of long-standing anxiety from their brows when they read the dispatches from Washington yesterday morning. Senator Perkins had saved the tariff on quicksilver. One of the State's most distinctive and richest industries was no longer in danger of being sunk in the bottomless sink of mis-legislation.

The story was that as the tariff bill left the House quicksilver was removed from the list of dutiable minerals. In the McKinley bill it bore a tariff of 10 cents a pound. The California miners, who are the only producers in the United States, at once set to work with figures and influences of various sorts to prevail upon the Senate to amend the matter. Things had been in a stew of unrest ever since until yesterday.

Mr. Staacke of the Bell Mining Co., when asked how the adjustment would satisfy the parties concerned, said: "Well, it's a compromise. Better half a loaf than no bread at all. The quicksilver mines have not been making any money for some time past, even under the McKinley law."

"Had the duty been removed entirely, we should simply have had to drop out of existence. It would be impossible to compete with the Rothschild Almaden mines in Spain, where the cost of labor is virtually nothing, and where the ore is extraordinarily rich and inexhaustible. What there costs only \$1 to produce costs \$10 here. Besides the output of the California mines more than supplies the demand of the American market when at its highest point."

"Since the price of silver went down and the mines all over the country closed up, the quicksilver trade has amounted to nothing. Silver mines consume one hundred times as much quicksilver as the gold mines. A hundred-stamp mill reducing silver requires as much quicksilver as all the gold mines in California. To show how little the latter use, the great Kennedy mine, which is paying \$40,000 to \$50,000 per month in dividends, does not require more than about one flask (76 1/2 pounds) per month."

"The total production of quicksilver in California under normal conditions is about 30,000 flasks a year. The old Almaden mine in Spain is producing at present some 50,000 flasks. Other mines in Europe are putting out about 20,000 flasks, making the total output for the world about 100,000 flasks. The American market now consumes no more than 15,000 flasks, if that many, which is one-half the possible supply of this State. So we are compelled to enter the European and Mexican markets in competition with Rothschild's great Almaden resources. Therefore it is easy to see how reasonable has been our anxiety about the preservation of the duty on our minerals. The figure should really have been maintained at 10 cents; but, as I said, we are glad to accept 7 cents when we can get no more."

Other prominent miners all accorded with Mr. Staacke. Without the tariff their business would have been ruined. With the prospect of losing it, one firm at least had prepared to close its mines.

The credit for the good work in Washington was generally conceded to J. B. Randol, of this city, whose name was quoted in the dispatches as having furnished important information to the Senate through Senator Perkins. Mr. Randol is recognized as an authority upon quicksilver mining.

San Francisco Metal and Coal Market.

ANTIMONY.		QUICKSILVER.	
Per lb.	@ 12	Home trade, pr.	flask, 35 @ 35 75
BORAX.		STEEL.	
Refined, in car lots	@ 7 1/2	English, D.	@ 20
Powdered, do.	@ 7 1/2	Canton tool.	@ 8 1/2
Concentrated, do.	@ 7 1/2	Bl'k Diam'd tool	8 1/2 @ 10
COPPER.		Pick & Hammer.	6 1/2 @ 10
Bolt.	23 @	Machinery.	4 @ 5
Sheathing.	23 @	Tool, Cal.	@ 24
Ingot, jobbing.	23 @	PIG TIN.	
Do, wholesale.	15 @	Spot @ lb.	23 @ 24
IRON.		COAL.	
Bar, base.	@ 2 1/2	Spot from yard—per ton.	
Norway, base.	@ 2 1/2	Wellington.	\$8 00
PIG IRON.		Greta.	7 50
Bpot.		Nansino.	6 25
Eglinton @ ton.	23 50 @	Gilman.	5 75
Glenbrook.	22 50 @	Seale.	7 00
Am. Bpts, No. 1.	@ 20	Oco Bay.	5 00
Shotts No 1.	22 50 @	Cannel.	8 75
Puget Sound.	@ 20	Egg, hard.	12 00
Olay Lane White.	22 50 @	Wallend.	7 00
Langdon.	22 50 @	Scotch Splin.	7 75
Gartbarrie.	22 50 @	Brymbo.	7 25
Barrow.	22 50 @	West Hartley.	7 25
Cargodect.	@ 20	COKE.	
LEAD.		Australian.	6 50 @
Pig.	@ 4	Liverpool Steam.	7 00 @
Bar.	@ 4 1/2	Scotch Splin.	7 50 @
Sheet.	@ 4 1/2	Cardiff.	7 00 @
Pipe.	@ 4 1/2	Lehigh Lump.	7 00 @
SILVER.		Cumberland.	9 00 @
Drop, sizes smaller than		Egg, hard.	10 00 @
B. @ bag of 25 lbs.	\$1 95	West Hartley.	9 25 @
Do do, B and larger sizes		COPPER.	
2 1/2 bag of 25 lbs.	2 10	English, to load.	\$9 00 @ 9 50
Bulk, Balls and Chilled		Do, spot, in bulk.	@11 50
do, @ bag of 25 lbs.	2 10	Do, in sacks.	@13 50
		Cumberland.	9 00 @

New York Prices.

NEW YORK, June 21.—Following are the closing prices for the week:

Silver in—		Copper.		Lead.		Tin.	
Thursday	28 1/2	62 1/2					
Friday	28 1/2	63 1/2	9 00	3 20	19 50		
Saturday	28 1/2	63	9 20	3 20			
Monday	28 1/2	62 1/2					
Tuesday	28 1/2	62 1/2	9 20	3 20	19 50		
Wednesday	28 1/2	62 1/2					

The local bullion, money and exchange quotations current are as follows:

Commercial Loans, per cent per annum.	7 @ 8
Commercial Loans, prime.	6 @ 8
Call Loans, gilt-edged.	7 @ 8

Call Loans, mixed securities.	7 @ 8
Mortgages, prime, taxes paid by lender.	7
New York Sight Draft.	12 1/2 @
New York Telegraphic Transfer.	150
London Bankers', 60 days.	\$4.88 1/2
London Merchants.	\$4.86 1/2
London Sight Bankers'.	\$4.89 1/2
Refined Silver, per ounce.	62 1/2
Mexican Dollars, nominal.	51 @ 51 1/2

A coal circular says: During the week 28,224 tons have arrived from the coast mines. Business generally is very quiet, as consumption is gradually easing off, the demand for domestic uses being very much lighter. The market is completely bare again of Australian; the last cargo which arrived has been already distributed among consumers, and some overdue vessels are anxiously looked for. In the interior British Columbia shipments are finding ready sale at full figures, and on arrival each vessel's cargo is delivered with dispatch.

Mining Share Market.

SAN FRANCISCO, June 21, 1894.

Little life was manifested in transfers during the week, nearly every one catching at the outcome in the 1700 level of the Con. Cal. & Va. as something to wait for. Next week's holiday will close a dull month in stocks. What July will bring is problematical. The total sales for last week were \$13,456. *The Enterprise* says:

Little can be learned of the result of the drilling on the 1700 level. The hole made through the recently discovered ore body on Sunday only shows the width. The ore extends both downward and toward the north, in which direction the drift is being run. Nothing of the width of the body at any other point is known, and it is presumable from the indications above that the ore was cut through at a narrow place. It is sincerely hoped that this is the case. An upraise for ventilation is being sent up from the west crosscut near the ore, which is an indication that more men will be put to work.

The Morgan mill will start in a few days to crush the large accumulation of high-grade ore from the Con. Cal. & Va. mine.

The supply will be kept up for a long time from the new ore body and from other points in the mine.

In the Occidental from the west ledge above the 400 level they continue to extract about eight tons of ore per week, of the average value of \$41 per ton as per car sample. The crosscut started near upraise 3 on the 500 level is in seven feet; face in hard porphyry.

In the Kentuck they have stopped work on the 1035 level for the present and have started to sink a winze in the east ledge on the 1100 level. The south drift from the Jacket incline is in 114 feet and continues in low-grade gold ore.

At the annual meeting of the stockholders of the Bodie Mining Company, 82,690 shares were represented. The following officers were elected for the ensuing year: H. D. Walker, president; R. B. Woodward, vice-president; E. P. Danforth, J. W. Kelley, M. E. Willis, W. H. King and L. Osborn, directors. M. E. Willis was elected secretary; J. W. Kelley, superintendent. The secretary's financial statement showed a credit of \$11,376.33. A motion to declare a stock dividend on the 11,030 shares of stock remaining in the company's treasury failed to carry. The president was subsequently authorized to sell the stock for the benefit of the company.

In the Savage on the 1030 level the west crosscut from the top of the upraise in the north drift has advanced 14 feet, total length 43 feet; face is in quartz giving some fair assays. The north lateral drift from the station was extended 11 feet, total length 106 feet; face is in ledge formation. They have started a west crosscut from the sixth floor of the south ore slopes and advanced same 12 feet; face is in quartz giving low assays. On the 1100 level west crosscut 2, started from the face of the north drift, was advanced 29 feet when it reached the west boundary of the quartz body and was discontinued; total length of drift, 106 feet. Work was resumed on the face of the north lateral drift on this level. During the week they have hoisted 77 cars of ore. Car samples average \$25.23 per ton.

The following illustrates the changes of the week:

MINES.		14	21
Utah.		\$ 5	5
Sierra Nevada.		57	37
Mexican.		1 10	78
Ophir.		2 80	1 95
Consolidated California and Virginia.		4 55	8 10
Best & Belcher.		1 55	1 05
Gould & Curry.		1 05	68
Savage.		75	52
Hale & Norcross.		41	25
Chollar.		58	45
Potosi.		22	15
Bullion.		10	
Excubquer.		15	09
Alpha.		10	20
Confidence.		70	50
Yellow Jacket.		87	55
Crown Point.		12	
Belcher.		13	
Overman.		25	20
Justice.		87	32
Alta Consolidated.		91	75
Consolidated New York.		62	41
Challenge.			
Bodie.			
Andes.			

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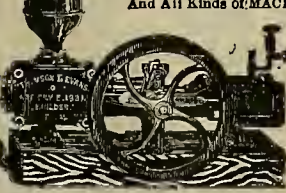
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COMPANY AND LOCATION.		No. AMT. LEVIED, DELINQ. AND SALE.		SECRETARY.	
A. & M. M. Co., California.	15	25	May 3, June 11, July 2	F. M. Husted, 530 California	
Alta M. Co., Nev.	46	100	May 14, June 19, July 10	J. E. Jacobs, 329 Montgomery	
Best & Belcher M. Co., Nevada.	56	250	April 30, June 3, June 25	L. C. Gerra, 329 Montgomery	
Bulwer Cons M. Co., Cal.	9	100	May 24, June 23, July 27	L. Osborn, 329 Montgomery	
Conlon G. M. Co., Cal.	2	50	May 28, June 30, July 20	T. Lynch, 26 Montgomery	
Cou New York M. Co., Nev.	13	50	May 11, June 19, July 12	C. E. Elliott, 329 Montgomery	
Cons. St. Gothard M. Co., Cal.	3	50	May 17, June 24, July 3	J. F. Holding, 113 Crocker Bldg	
Ecclipsa M. Co., Cal.	8	20	June 8, July 10, July 31	Otto Tum Suden, 530 California	
Evening Star, California.	14	10	June 5, July 14, Aug 4	J. S. Seville, 329 Sansome	
Golden Prize M. Co., Nev.	6	250	April 23, May 26, June 23	O. D. Bennett	
North Star M. Co., Nevada.	105	250	May 1, June 5, June 25	A. B. Thompson, 329 Montgomery	
Kentuck Cons M. Co., Cal.	9	100	May 9, June 11, July 3	Aug. Waterman, 329 Montgomery	
Mexican G. & S. M. Co., Nev.	50	250	June 12, July 17, Aug 7	C. E. Elliott, 79 Nevada Block	
Occidental Cons M. Co., Nevada.	16	100	May 31, July 5, July 31	A. K. Durkrow, 69 Nevada Block	
Ophir M. Co., Nevada.	62	250	May 4, June 6, June 25	E. B. Holmes, 329 Montgomery	
Seg Belcher & Midea, Nev.	14	100	June 12, July 18, Aug 6	E. B. Holmes, 329 Montgomery	
Silver King M. Co., Arizona.	10	200	May 2, June 11, July 9	J. W. Pow, 310 Pine	
Union Cons M. Co., Nevada.	11	10	May 15, June 25, July 16	A. Halsey, 329 Montgomery	
Virginia Cons. Cal.	49	150	June 20, July 25, Aug 15	O. O. Harvey, 329 Montgomery	
	11	50	May 14, June 20, July 16	A. F. Benard, 26 C. Farrell	

COMPANY AND LOCATION. MEETING, SECRETARY AND OFFICE IN S. F. DATE.

North Bulla Isle M. Co., Cal. Annual. J. W. Pow, 310 Pine. June 27

West Con Va & Cal M. Co., Nev. Annual. J. H. Andros. July 10

West Con Va & Cal M. Co., Nev. Annual. J. H. Andros. June 27

Board Sales of Mining Stocks.

S. F. Stock Board.

THURSDAY, June 14, 1894.

9:30 A. M. SESSION.

200 Alta.	200 250 Confidence.	900
100 Andes.	410 100 H. & N.	570
500 Bullion.	700 200 Belcher.	500
100 Alpha.	90 100	580
100 Belcher.	550 400 Mexican.	780
450	550 250.	750
Best & Belcher.	1 05 250 Ophir.	1 50
550	1 05 250 Ophir.	1 50
300 Bodie.	750 150	1 85
50	750 125	1 95
500 Bullion.	150 50 Potol.	450
500 Bullion.	300 200 Belcher.	400
300 Challenge.	3 40 250	330
800 Chollar.	250 200 Seg Belcher.	550
800 Crown Point.	500 300 Sierra Nevada.	610
450 Con. Cal. & Va.	450 200 Ophir.	530
1050	3 05 200 Yellow Jacket.	410
300	3 10 100	330
500 G. & O.	650 200	300
300	550 150	370
350	640	

2:30 P. M. SESSION.

400 Ophir.	1 70 200 Bulwer.	40
250	1 75 200 Alpha.	50
500	700 200 Belcher.	500
700	650 400	750
900 G. & O.	510 300 Confidence.	850
150	620 150 Sierra Nevada.	670
410 B. & V.	4 05 100	550
800 O. G. & V.	4 30 100 Bullion.	140
100 Savage.	350 200 S. B. & M.	40
150	360 100 Overman.	120
100	370 100	110
500 Chollar.	250 100 Justice.	130
900 Potol.	40 200 Union.	330
100	410 100	320
100	420 300 Alta.	160
200 H. & N.	510 200	160
900	550 150	170
75 Crown Point.	430 200 Caledonia.	30
350	430 300 Challenge.	320
500 Yellow Jacket.	380 100	340
100 Bodie.	720 200 Andes.	380

DIVIDEND NOTICE.

SAN FRANCISCO SAVINGS UNION,
533 California St., Cor. of Webb.

For the half year ending with the 30th of June, 1894, a dividend has been declared at the rate of four and eight-tenths (4 8/10) per cent per annum on term deposits and four (4) per cent on ordinary deposits, free of taxes, payable on and after Monday, the 2nd day of July, 1894.
LOVELL WHITE, Cashier.

Assessment Notices.

OCCIDENTAL CON. MINING COMPANY—LOCATION of principal place of business, San Francisco, California; location of works, Silver Star Mining District, Storey County, Nevada.

Notice is hereby given that at a meeting of the Board of Trustees, held on the thirty-first day of May, 1894, an assessment (No. 16) of Ten Cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the Secretary, at the office of the Company, Room 69, Nevada Block, No. 309 Montgomery Street, San Francisco, California. Any stock upon which this assessment shall remain unpaid on the fifth day of July, 1894, will be delinquent, and advertised for sale at public auction, and unless the payment is made before, will be sold on TUESDAY, the thirty-first day of July, 1894, to pay the delinquent assessment, together with the costs of advertising and expenses of sale. By order of the Board of Trustees.
ALFRED K. DUREBROW, Secretary.

Office—Room 69, Nevada Block, No. 309 Montgomery Street, San Francisco, California.

Cal. Debris Commission Notices.

THE CALIFORNIA DEBRIS COMMISSION having received applications to mine by the hydraulic process from L. V. Teft in the Oconordia mine, near Oronburg, Plumas County, to deposit tailings behind dams in Cogswell Ravine and Jackson Creek; from the Northern Placer Mining Company in their mine near Oronburg, Plumas County, to deposit tailings behind brush dams in Little Long Valley Creek; and from Thomas White in the Schuyler mine, near Dry Creek, Shasta County, to deposit tailings behind dams in Dry Creek, gives notice that a meeting will be held at Room No. 92, Flood Building, San Francisco, Cal., on June 26th, 1894, at 1:30 P. M.

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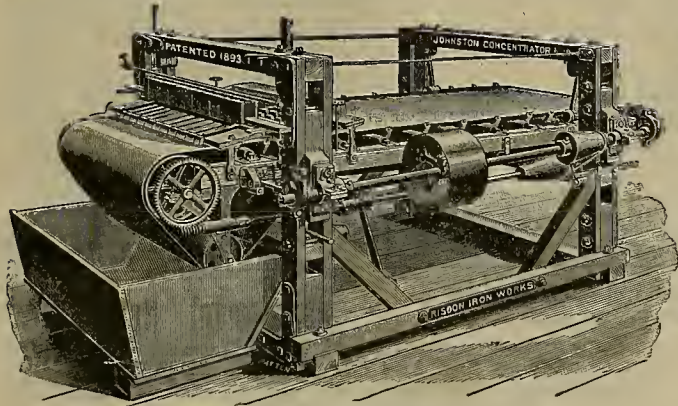
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SIMPLICITY OF CONSTRUCTION. GREAT DURABILITY. EASE OF OPERATION. INCREASED PERCENTAGE OF SULPHURETS SAVED.



THE JOHNSTON CONCENTRATOR.

(EXTRACT.)

RISDON IRON WORKS—The machine has the same monotonous record, i. e., they absolutely save all except traces of sulphurets. Ship Two more as soon as possible. Respectfully,

(COPY.)

THE RISDON IRON AND LOCOMOTIVE WORKS, San Francisco—GENTLEMEN: We have tested the Johnston Concentrator furnished us by you on trial, and after an exhaustive test, we are satisfied it is the best in the market. Please prepare and ship us—as soon as possible—THIRTEEN more machines. Yours truly,

{ GOLD BLUFF MINE, DOWNIEVILLE, CAL., Jan. 24, 1894. W. KRAFT, Superintendent.

SAN FRANCISCO, CAL., June 1, 1894.

By LEON SLOSS.

**MANUFACTURED BY
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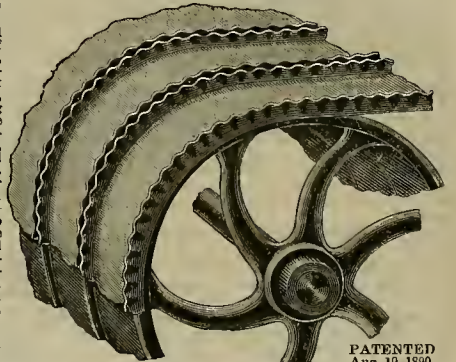
21 & 23 FREMONT ST., S. F.

THE WOODBURY ORE CONCENTRATOR WITH IMPROVED BELTS Was awarded the Highest (Bronze Medal) 1891. MORE THAN DOUBLE THIS CAPACITY with one-half less power and occupying less than one-half the space of any other concentrator. Built of Best Steel and Wrought Iron. Strong and Durable. Price \$575 f.o.b. Send for Catalogue and Testimonials. The annexed cut shows the belt in its improved form, which consists of corrugated edges, to form an expanding top edge. THE IMPROVED MACHINE HAS THE FOLLOWING MERITS: First—The improved belts, which consist of seven,

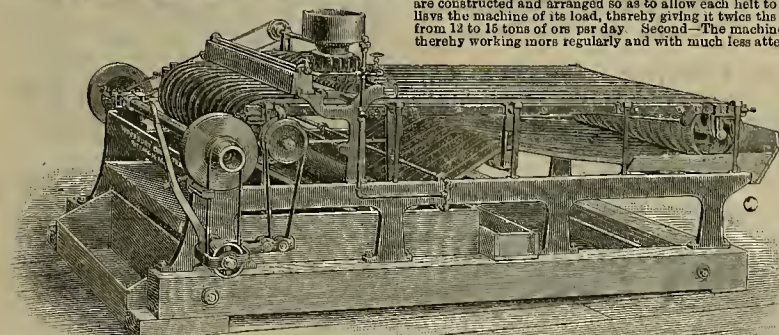
are constructed and arranged so as to allow each belt to receive a portion of the pulp in such a manner as to relieve the machine of its load, thereby giving it twice the capacity of other concentrators, and enabling it to work from 12 to 15 tons of ore per day. Second—The machine equalizes the load by having several compartments, thereby working more regularly and with much less attention than is necessary to give other concentrators using wide belts. Each of the belts on this machine takes care of the pulp that is allotted to it—in this way preventing the pulp from running to the lower side of it, as is the case when a machine becomes out of level where wide belts are used. Third—The belts run on a perfect line, needing no adjustment to prevent their running from side to side, as in other concentrators. Fourth—The belt surfaces are improved by indentations and corrugations, causing the Concentrator to save fine sulphurets and quicksilver, and perform close work. Fifth—The belts have fluted or corrugated edges, to form an expanded top edge, which effectually prevents from cracking. Sixth—The feed arrangement is perfect. Seventh—The machine is constructed of iron, with steel crank-shaft self-oiling boxes, and everything made in the most thorough manner, enabling it to run with very little attention or wear.

THE SAN JACINTO ESTATE—Office of the General Manager, OAJALCO, Oct. 30, 1891.

GEO. E. WOODBURY, Esq.—Dear Sir: In reply to yours of the 27th inst., respecting the working and efficiency of the "Woodbury" Concentrator placed in our works by you, I am pleased to inform you that it is giving entire satisfaction; it has a much greater capacity than any other machine, and is doing fully one-third more work, with the concentrates equally clean, as from either of the machines at work here. Yours faithfully, S. HARRIS, Manager.



PATENTED Aug. 13, 1890.



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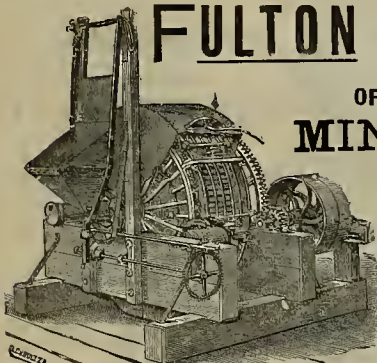
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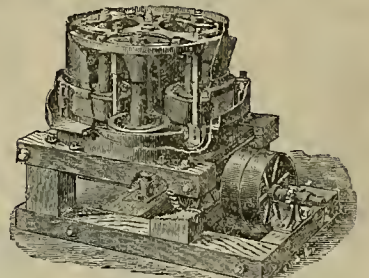
Specialties Manufactured by us:—"HUNTINGTON" BLAKE ROCK BREAKER; "FULTON" BLAKE ROCK BREAKER; FINE VANNERS; "BOSS" CONTINUOUS SYSTEM.

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VOLUME LXVIII.
Number 28.

SAN FRANCISCO, SATURDAY, JUNE 30, 1894.

Three Dollars per Annum.
SINGLE COPIES, 10 CENTS.

Air Compressors and Pelton Wheels.

Herewith is shown a pair of Ingersoll-Sergeant compressors driven by Pelton wheels attached to driving shafts direct. This plant was built for a mine in Peru, South America, located in the heart of the Andes, some 100 miles east of Lima, and was made in sections for mule packing, no piece in the entire outfit exceeding 300 pounds in weight.

The wheels are four feet diameter and run under a head

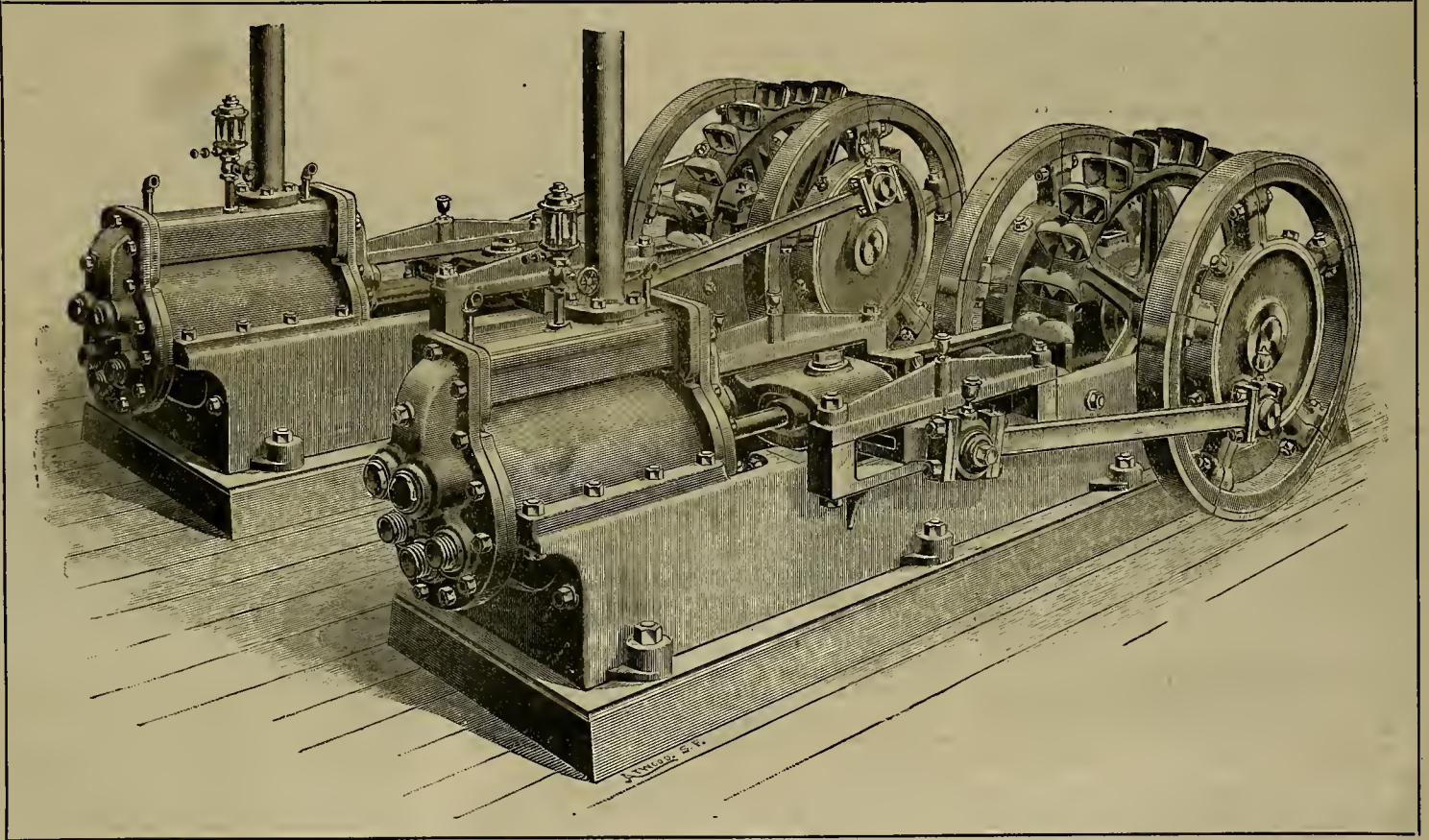
twelve or sixteen feet in diameter, as may be necessary to give proper speed to the machinery they are designed to run, suiting the buckets and nozzle delivery to conditions as to head and power requirement.

Fly-wheels were made necessary in the case here referred to from the fact that the water head was too low to admit of making the wheels large enough to carry the weight required for combined motor and fly-wheel and give the necessary speed to compressors.

Full information regarding such an application as is

An Important Project.

Capt. De Lamar, famous in Idaho, has a scheme, said to be well backed financially, which is of great interest to a rich mining region comprising western Utah, southern Nevada and southwestern California. He has lately bought the principal mines in the once-famous Ely district, comprising Pioche, Nev., and outlying territory, and considerable valuable water rights and railroad property, and is about to build a railroad from Milford, the present



PAIR OF INGERSOLL-SERGEANT COMPRESSORS, WITH PELTON WHEELS.

of fifty feet, making 120 revolutions. Water is brought from a stream through a line of 18-inch pipe, and applied to the wheels by double nozzles with three-inch openings. The air cylinders are ten inches diameter by 18-inch stroke, and the wheels under this comparatively low head afford sufficient power to maintain seventy pounds pressure on the receiver at an elevation of 10,000 feet above sea level.

The advantages of attaching the wheels to the compressor shafts are: Economy of power as well as in first cost; lessened cost of freight, and lessened cost of setting up the machinery, as well as in the absence of belt connections, the maintenance of which with loss of power involved are matters of importance in many mining localities. This application of the Pelton wheel is made with equal facility to all forms of compressors, as well as blowers and many other classes of machinery, and where the head admits, the wheel can be made heavy enough to serve as a fly-wheel, thus simplifying and cheapening still more this manner of applying power. Wheels in such cases may be made of any size ranging from six up to

here shown can be obtained from the Pelton Water Wheel Company of this city, or from their New York office, 143 Liberty street.

THE "State Anti-Debris Association" has addressed a long letter to the United States Debris Commission, in which the Association proffers, "without cost," the services of its paid spies. This is a bold bid for alliance. The "Association" does not seem to realize that dignity demands that a Federal organization should be unapproached by such offers from any source. Such action can only serve to cover the Association with deserved contempt.

SOME good men in Chicago are advertising an Idaho mine that "will pay a net profit of \$1000 a day." They are willing to let the stock go at prices reasonably dear, though it is evident that pure philanthropy prompts their motives, as it would be so easy to keep the stock of the mine at Gibbonsville, Idaho, themselves, and, incidentally, keep the daily profit of a thousand dollars therefrom.

terminus of that branch of the Union Pacific, to Pioche, and southwesterly, connecting with the Nevada Southern, now building eastward from Barstow, San Bernardino county, this State, on the Atlantic and Pacific. The length of the main line of the road from Milford to the Pioche property will be two hundred miles. This will be a boon and a boom to a rich but isolated mining region, and, incidentally, will result in an additional line of railroad from the Wahsatch to this State.

This paper is in receipt of arguments for and against the passage of an extension of time assessment law. The chief argument of those against it comes from the State of Washington, and practically is that it will prevent men from getting a job to do the work from the owner of the property, and that it will "prevent the development of the country." Assessment work, ordinarily, does not "develop the country" very much, and where one man is kept out of a job by the operation of the extension, a hundred will be relieved of a compulsory expense at the very time when relief will be of most benefit. The bill will go through all right and is a present necessity.

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San Francisco, June 30, 1894.

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Four Centuries of Fluctuation.

It is by comparison of long periods of time that the most correct estimates can be made of the truth or falsity of certain statistical propositions. Upholders of the single gold standard claim that the violent fluctuations in the relative values of gold and silver in the last twenty years have been occasioned by the increased production of silver during that time. While twenty years is a long time in the history of a nation, yet twenty times twenty years is none too long in being taken as a period of time in which to illustrate similar fluctuations in so important and eternal a factor in the world's wealth as the relative values of gold and silver. Statistics of the annual production of gold and silver in the world since the discovery of America herein condensed to ordinary limits show that from 1492 to 1545 for each ounce of gold mined twenty-nine ounces of silver were mined. From 1545 to 1560 the proportion was 35 to 1; from 1561 to 1580, 45 to 1; from 1581 to 1600, nearly 60 to 1. From 1600 to 1840 the relative yield at no time fell below 22 to 1, and most of the time it ran from 25 to 1 to 50 to 1. In 1800 it was exactly 50 to 1. In 1810 the percentage was 1.9 of gold to 98.1 of silver. From 1841 to 1850, 14 times as much silver was mined as gold. Then came California and Australia, and till '60 the average was one ounce of gold to four of silver. Since then it is estimated the proportion has averaged 1 to 23.

When such a segment of time as that is taken it shows that unusual production of the yellow metal has been followed by excessive production of the white, and vice versa, and that in these great swings of the pendulum on Time's dial the relative proportion of the world's stock of the two has not been greatly disturbed.

There is nothing new about this question of monometallism or bimetalism. It is no more of a novelty than many other things of present discussion, supposed to be new, but in reality as old as the Book of Job. The only new factor is present environment, the change of rapid intercommunication, etc. The question comes up for the twentieth time, and will, doubtless, in the long run be settled as so often before, in favor of the only natural law—bimetalism—till the next upheaval comes, to be settled again the same way, and so on through the circling cycles of Time's changing course.

THE "Consolidated" mining cases at Mogollons, Socorro county, N. M., has been decided in favor of the defendants. It has attracted some attention among miners. It has been in the courts for over four years. The gist of the verdict is that so far as that case decides anything, where assessment work done upon one claim is to inure to the benefit of others, the claims must be contiguous, and all owned by the same parties, and the work must also tend to develop all the claims.

A Question for Decision.

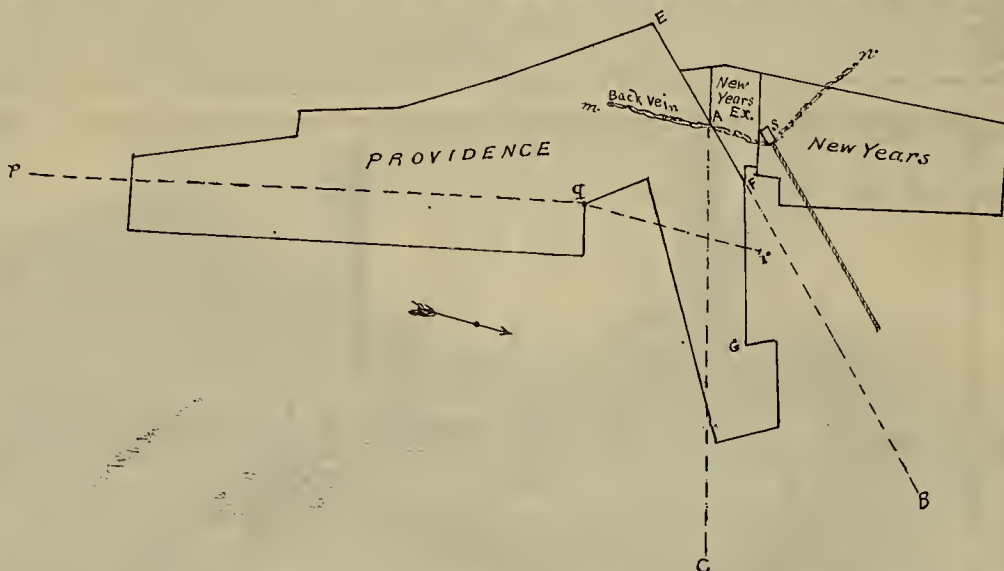
A. Walrath vs. Champion Mining Co.

This cause, which was tried by U. S. Circuit Judge Hawley of Nevada, sitting for Judge McKenna in this city in the month of May, and which was submitted for decision, affects important property rights in Nevada county and involves legal questions which have not been heretofore decided as to the rights of the owners of mining claims held under patents granted under the act of 1866 as to veins other than the one upon which the patent was granted as well as to the construction of end lines.

In this action the plaintiff, A. Walrath, is the owner of the Providence mine; the defendant, Champion Mining Co., is the owner of the New Year's and New Year's Ex. claims.

In the year 1870 a patent was granted by the United States to the Providence lode, shown on the diagram at P. Q. R.; also to the piece of surface ground marked Providence. On this vein an incline shaft was sunk 1500 feet deep, and extensive mining operations carried on. From this shaft two crosscuts were run 600 feet to the west, and another vein opened up and worked by the Providence Mining Company, this hack vein having its apex on the line M. S. N.

On this vein, at the point S, the Champion Mining Co. has sunk a shaft 1000 feet deep on the pitch, and has extended its works and taken out ore south of the line E. B.



The plaintiff asks for an injunction to restrain defendant from working south of the line E. B., and for damages for ore removed south of said line.

The contentions of plaintiff are that whereas the act of 1866 only granted to the Providence claim the lode P. Q. R., that the mining act of Congress of May 10, 1872, gave it the additional grant of all other veins, the apexes of which were situated within the surface lines of said claim, with the right to follow the same on their dip to any depth, and that the line E. F., which is crossed by the apex of said vein, is the end line on said vein, and that the right to follow said vein on its dip and strike is limited by a plane passed through said line E. F. and its continuation.

It was further claimed that a location made by the Champion Mining Co. in the year 1884, containing a clause of abandonment south of the line E. F., made said line a compromise line, and that defendant was debarred from asserting any rights south of said line.

The defendant contends that the line E. F. is a line which limits the claim of the Providence mine to said vein on its strike, but that the rights on the dip are limited by a plane passed through the point A. and parallel with the line F. G., being the line crossed by the patented lode P. Q. R.

That the claimed abandonment was not of such a nature as to make the plaintiff a party to same, and that when defendant obtained from the land office the receiver's receipt for a patent, that it gave a new title, which barred any claimed compromise.

The portion of the mine in dispute is that portion of the hack vein included in the lines A. B. and A. C. The peculiarity of this action relates to the numerous irregular shaped pieces of surface ground which were patented to mine owners under the act of 1866 and the application of the act of 1872 and the decisions of the courts thereunder; the difference between the two acts being that under the law of 1866 a patent was granted for a number of feet of a vein, with a piece of ground for working purposes, which could be taken in any shape. Under the act of 1872 a piece of ground is patented, which is practically supposed to be a parallelogram containing a vein.

The decision is awaited with some interest.

Senate Bill No. 1515.

Following is the full text of Senator Stewart's bill, which passed the U. S. Senate on the 15th inst:

A Bill to Amend Chapter Six of Title Thirty-two of the Revised Statutes, Relating to Mineral Lands and Mining Resources.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That section twenty-two hundred and twenty-four of the Revised Statutes be amended so as to read:

"SEC. 2324. The miners of each mining district may make regulations, not in conflict with the laws of the United States or with the laws of the State or Territory in which the district is situated, governing the location, manner of recording the amount of work necessary to hold possession of a mining claim, subject to the following requirements: The location must be distinctly marked on the ground by posts or monuments, so that its boundaries can be readily traced. All records of mining claims hereafter made shall contain the name or names of locators, the date of the location, and such a description of the claim or claims located as will identify the claim. On each lode claim located after the tenth day of May, eighteen hundred and seventy-two, and until payment of the purchase money and a certificate of entry has been issued therefor not less than one hundred dollars' worth of labor shall be performed or improvements made during each year. On all lode claims located prior to the tenth day of May, eighteen hundred and seventy-two, ten dollars' worth of labor shall be performed or improvements made during each year for each one hundred feet in length along the vein until payment of the purchase money and a certificate of entry has been issued therefor; and for each twenty acres of placer claims, and for each subdivision thereof less than twenty acres, fifty dollars' worth of labor shall be performed or improvements made during each year until payment of the purchase money and a certificate of entry shall be issued therefor. But where several adjoining lode claims, not exceeding five, are owned or held by the same person, association, or corporation, and the sum of five hundred dollars or more is expended in any one year in good faith for the development of all of the claims so owned or held, not exceeding

five, there shall be no requirement for separate labor or improvements to be performed or made on the several claims so owned or held during such year. The year within which the annual labor or improvements required to be performed or made by this section shall commence at twelve o'clock meridian on the first day of October of each year: *Provided*, That upon claims located previous to the first day of March to any year the annual labor or improvements shall be performed or made on such claims for that year prior to twelve o'clock meridian of the first day of October next succeeding; and upon claims located after the last day of February and prior to twelve o'clock meridian of the first day of October in any year the annual labor or improvements required shall be performed or made within one year from twelve o'clock meridian of the first day of the succeeding October: *And provided further*, That only one-half of the annual labor or improvements required by this Act shall be necessary to be performed or made prior to twelve o'clock meridian of the first day of October, in the year eighteen hundred and ninety-five, but after the first day of October, in the year eighteen hundred and ninety-five, the full amount of labor or improvements required by this Act shall be performed or made upon such claims as in all other cases during each year prior to twelve o'clock meridian of the first day of October. In case the first day of October falls on Sunday or any holiday the following secular day shall be construed as the first day of October within the meaning of this Act. When the labor required by this Act shall have been performed or the improvements made an affidavit may be filed within thirty days after the time limited for performing such labor or making such improvements with the recorder of deeds of the county in which the claim or mine is situated, particularly describing the labor performed and improvements made, and the value thereof, which affidavit shall be prima facie evidence of the facts therein stated. And upon a failure to comply with the conditions of this Act to the performance of labor or making of improvements, the claim or mine upon which such failure occurred shall be open to relocation in the same manner as if no location of the same had ever been made: *Provided*, That the original locators, their heirs, assigns, or legal representatives, do not resume work upon the claim after such failure and before such relocation, and continue the same with reasonable diligence until the required amount of labor shall have been performed or improvements made; but no relocation of a claim by a person who has already located such claim and failed to comply with the conditions of this Act in performing work or making improvements shall be valid prior to such resumption and continuance of work upon such claim. Upon the failure of any one of several co-owners to contribute his proportion of the expenditures required hereby the co-owners who have performed the labor or made the improvement may, at the expiration of the year, give such delinquent co-owner personal notice in writing or notice by publication in the newspaper published nearest the claim, for at least once a week for ninety days, and if at the expiration of ninety days after such notice in writing or by publication such delinquent shall fail or refuse to contribute his proportion of the expenditure required by this section, his interest in the claim shall become the property of his co-owners who have made the required expenditures. A copy of such notice, together with an affidavit showing personal service or publication, as the case may be, of such notice, when filed and recorded with the recorder of deeds of the county in which such mining claim is situated, shall be evidence of the acquisition of title of such co-owners. Where a person or company has or may run a tunnel for the purpose and with the intent to good faith of developing a lode or lodes owned by said person or company, the money so expended in running said tunnel shall be taken and considered as expended on such lode or lodes: *Provided*

further, That said lode claim or claims shall be distinctly marked on the surface, as provided in this Act."

SEC. 2. That section twenty-three hundred and twenty-five of the Revised Statutes be so amended as to read:

"SEC. 2325. A patent for any land claimed and located for valuable deposits may be obtained in the following manner: Any person, association, or corporation authorized to locate a claim under this chapter, having claimed and located a piece of land for such purposes, who has, or have, complied with the terms of this chapter, may file in the proper land office an application for a patent, under oath, showing such compliance, together with a plat and field notes of the claim or claims in common, made by or under the direction of the United States surveyor-general, showing accurately the boundaries of the claim or claims, which shall be distinctly marked by monuments on the ground, and shall post a copy of such plat, together with a notice of such application for a patent, in a conspicuous place on the land embraced in such plat previous to the filing of the application for a patent, and shall file an affidavit of at least one person that such plat and notice have been duly posted, and shall also file a copy of the notice in such land office, and shall thereupon be entitled to a patent for the land in the manner following: The register of the land office, upon the filing of such application, plat, field notes, notices, and affidavits, shall publish a notice that such application has been made, for a period of sixty days, in a newspaper to be by him designated as published nearest to such claim; and he shall also post such notice in his office for the same period. The claimant at the time of filing this application, or at any time thereafter within the sixty days of publication, shall file with the register a certificate of the United States surveyor-general that five hundred dollars' worth of labor has been expended or improvements made upon the claim by himself or grantors; that the plat is correct, with such further description by such reference to natural objects or permanent monuments as shall identify the claim, and furnish an accurate description, to be incorporated in the patent. At the expiration of the sixty days of publication the claimant shall file his affidavit, showing that the plat and notice have been posted in a conspicuous place on the claim during such period of publication. If no adverse claim shall have been filed with the register and receiver of the proper land office at the expiration of the sixty days' publication it shall be assumed that the applicant is entitled to a patent, and that no adverse claim exists, and upon the payment to the proper officer of five dollars per acre he shall receive a certificate of entry; and thereafter no objection from third parties to the issuance of a patent shall be heard except it be shown that the applicant has failed to comply with the terms of this chapter. But no more than three thousand feet in length along the vein on claims located prior to the tenth day of May, eighteen hundred and seventy-two, and not more than the extent of fifteen hundred feet in length by six hundred feet in width located after said date, shall be included in the same application for a patent, and not more than forty acres of placer or petroleum ground shall be included in the same application for a patent: *Provided*, That when fractional claims are located or sought to be patented between other existing claims the end lines may be made to conform to the lines of such adjoining claims."

SEC. 3. That section twenty-three hundred and thirty-four of the Revised Statutes be amended by adding thereto the following: "And the surveyors appointed under the provisions of this section shall have power to administer oaths to their assistants."

SEC. 4. That section twenty-three hundred and thirty-five of the Revised Statutes be amended so as to read:

"SEC. 2335. All affidavits required to be made under this chapter may be verified before any officer authorized to administer oaths in any State or Territory of the United States or in the District of Columbia having an official seal, and all testimony and proofs may be taken before any such officer, and when duly certified by the officer taking the same, attested by his seal of office, shall have the same force and effect as if taken before the register and receiver of the land office. In cases of contest as to the mineral or agricultural character of land the testimony and proofs may be taken, under such regulations and notice as the Commissioner of the General Land Office may prescribe: *Provided*, That the presence of rock in place bearing gold, silver, cinnabar, petroleum, or other valuable mineral shall be regarded as prima facie evidence that the land containing the same is mineral in character: *And provided further*, That in investigating the character of land with a view to ascertain whether it is more valuable for mineral than agriculture, evidence may be taken of the mineral discovered or developed adjacent to such land."

SEC. 5. That section twenty-three hundred and thirty-seven of the Revised Statutes be amended so as to read:

"SEC. 2337. Where non-mineral land not included in a lode claim is used or occupied, or is intended in good faith to be used or occupied by the proprietor of such vein or lode claim for mining or milling purposes, such non-mineral surface ground may be embraced and included in an application for a patent for such vein or lode claim, and the same may be patented therewith or separately, subject to the same preliminary requirements as to survey and notice as are applicable to vein or lode claims; but no location hereafter made of such non-mineral land shall exceed ten acres, and payment for the same must be made at the same rate as fixed by this chapter for the superficies of the lode claim. The owner of a quartz mill or reduction works, not owning a mine in connection therewith, may also receive a patent for his mill site as provided in this section."

SEC. 6. Amend section twenty-three hundred and thirty-eight of the Revised Statutes so as to read:

"SEC. 2338. As a condition of sale each patent shall reserve the right of way through or over any mining claim for roads, ditches, canals, cuts, tunnels and other easements, for the purpose of working mines and for agricultural purposes: *Provided*, That any damages occasioned thereby shall be assessed and paid in the manner provided by the laws of the State or Territory in which such mine is situated for assessments and payments for land taken for public use under the right of eminent domain. And the rights and easements heretofore reserved under the provisions of this section (twenty-three hundred and thirty-eight of the Revised Statutes) in patents heretofore issued shall be regulated and made available as herein prescribed."

SEC. 7. That town-site entries may be made by incorporated towns and cities on the mineral lands of the United States, but no title shall be acquired by such towns or cities to any vein of gold, silver, cinnabar, copper or lead, or to any valid mining claim or possession held under existing law. When mineral veins are possessed within the limits of an incorporated town or city, and such possession is recognized by local authority or by the laws of the United States, the title to town lots shall be subject to such recognized possession and the necessary use thereof; and when entry has been made or patent issued for such town sites to such incorporated town or city, the possessor of such mineral vein may enter and receive patent for such mineral vein and surface ground recognized by the local laws and statutes of the United States not held or possessed adversely to the claimant for such mineral vein by other than the said city or town, or when it shall appear that the claimant otherwise entitled to such mineral vein has acquired title to such surface ground from the said city or town: *Provided*, That no entry shall be made by such mineral-vein claimant for surface ground where the owner or occupier of the surface ground shall have had possession of the same before the inception of the title of the mineral-vein applicant."

ELSEWHERE is published the full text of the amended mining law, introduced by Senator Stewart of Nevada, which passed the Senate on the 15th inst. 'Tis twenty-eight years since he introduced and had passed in the same body the first general mining law passed by the United States Government.

A Year's Work of the Commission.

The California Debris Commission, with offices in the Flood Building in this city, has about finished the first year's active work. A great deal has been done, and as the satisfactory working of the law becomes more and more apparent, it is probable that even more will be accomplished in the ensuing year. The highest ability and the most conscientious care have characterized the actions of the Commission, and in nearly every instance the results have been commensurate with the efforts made to secure success and mutual satisfaction.

An elaborate system of official statistics is kept, showing the amount of work performed in issuing permits to work hydraulic mines under the provisions of the Caminetti law. For instance, is given a synopsis of the record in the case of the Farrell mine, the second to make application and the first to begin work:

No. 2.—Farrell mine, located near Columbia Hill, Nevada Co.; permit applied for by Eureka Lake and Yuba Canal Co., Consolidated; P. O. Address, Nevada City, Cal. Petition for permit received Aug. 2, 1893; mine drains into Middle Yuba river; nature of proposed dam, earth and logs, twelve feet high, across mouth of old hydraulic pit; approximate capacity, 212,000 cubic yards. Advertised Aug. 18, '94; mine visited by Lieutenant-Colonel Benyard and Major Heuer; meeting held September 4, '93. Then come dates of the order issued, detail plans received, notice of approval; work inspected; by whom permit to mine issued; commenced to work.

Following is a brief summary of information regarding the name, location, ownership, etc., of the sixty-three applications made since the Commission began to receive them:

- 1.—Kelly Hill, Tp. 23 N., R. 6 E., Butte Co.; name of applicant, R. M. Moore, Chico, Cal.; mine drains into tributary of the Sacramento; the approximate capacity of the dam, 200,000 cubic yds.; permit issued, March 27, '94; work began, April 1, '94.
- 2.—Farrell, Columbia Hill, Nevada Co.; Eureka Lake and Yuba Canal Co., Nevada City, Cal.; drains into Middle Yuba; 212,000 cubic yards; permit issued Sept. 9, '93; work began Sept. 13, '93.
- 3.—Omega, Omega, Nevada Co.; M. C. Tully, Stockton, Cal.; South Yuba; 1,000,000 cubic yards; petition received Aug. 16, '93; permit not yet issued.
- 4.—Richmond Hill and Saw Pit Flat, Onion creek, Plumas Co.; Good Hope Mining Co., Oakland, Cal.; Middle Feather; Aug. 25, '93; not issued.
- 5.—Brandy City, Brandy City, Sierra Co.; 1,940,000 cubic yards; Middle Yuba; A. Steinberger, S. F.; Sept. 19, '93.
- 6.—Blue Nose, Pilot Peak, Plumas Co.; 50,000 cubic yards; Middle Feather; B. Below, Oakland, Cal.; Sept. 19, '93.
- 7.—Blue Gravel, Smartsville, Yuba Co.; Yuba; Excelsior Water and Mining Co., Smartsville, Cal.; 2,885,000; Sept. 27, '93; granted Oct. 17, '93; began work Nov. 1, '93.
- 8.—Illinois Gold Gravel Mine, La Porte, Plumas Co.; Yuba; Buckley & Hillman, La Porte, Cal.; 35,000; Sept. 29, '93; Jan. 31, '94; began work April 13, '94.
- 9.—New York Gold Gravel Mine, Tp. 21, R. 12 E., Sierra Co.; Yuba; Westall & Hughes, Sierra City, Oct. 12, '93; Dec. 5, '93; May 1, '94.
- 10.—Corbiere & Bean, Hampshire creek, Butte Co.; 2000; Yuba; Corbiere & Bean, Clipper Mills, Cal.; Oct. 9, '93; Nov. 21, '93; D. C. 1, '93.
- 11.—Phoenix Gold Gravel Mine, Hepsidam, Sierra Co.; Yuba; W. A. and M. E. Schofield, Hepsidam, Cal.; Oct. 14, '93.
- 12.—Eureka Mining Co., Downieville, Sierra Co.; 15,000; Yuba; Eureka Mining Co., Downieville, Cal.; October 16, '93; May 29, '94; May 31, '94.
- 13.—Craycroft Hill Placer Mining Claim, Downieville, Cal.; 21,000; Yuba; Craycroft Mining Company; October 16, '93; May 29, '94; May 31, '94.
- 14.—Excelsior Hydraulic Mining Claim, Downieville; Yuba; Excelsior Mining Co., Downieville, Cal.; Oct. 16, '93; May 29, '94; May 31, '94.
- 15.—Spanish Ranch, Spanish Ranch, Plumas Co.; North Feather; Quincy Mine & Water Co., San Francisco; Oct. 18, '93; 2,000,000; April 14, '94; April 16, '94.
- 16.—Polar Star, Dutch Flat, Placer Co.; 605,000; Bear; John Spaulding, Dutch Flat; Nov. 3, '93; Dec. 13, '93; Dec. 15, '93.
- 17.—A. Denmore, Howard Creek, Sierra Co.; 3100; North Yuba; A. Denmore, Downieville; Nov. 3, '93.
- 18.—Nevada, Gibsonville, Sierra Co.; 6000; Yuba; Geo. W. Cox, Gibsonville; Dec. 12, '93.
- 19.—54 Flat, Volcano, Amador Co.; 72,600; Mokelumne; 54 Flat Mining Co., Sutter Creek, Cal.; Nov. 4, '93; Feb. 6, '94; Feb. 14, '94.
- 20.—Red Hill, Ono, Shasta Co.; 900,000; Sacramento; Nathan Gardiner, Ono, Cal.; Nov. 16, '93; Feb. 6, '94; Feb. 26, '94.
- 21.—Badger, Tp. 30 N., R. 6 W., Sierra Co.; Cottonwood; W. R. Stewart, Igo, Cal.; Nov. 29, '93; Jan. 2, '94; March 11, '94.
- 22.—First Chance, Howard Creek, Sierra Co.; 8690; North Yuba; F. E. Barberio, Sierra City; Dec. 4, '93; Jan. 2, '94; April 23, '94.
- 23.—Tanney Ravine, Challenge Mill, Yuba Co.; 400; Yuba; W. R. Reed, Brownsville, Yuba Co.; Dec. 4, '93; Jan. 10, '94; Jan. 14, '94.
- 24.—Mateos, Howard Creek, Sierra Co.; North Yuba; Manuel Mateos, Sierra City, Cal.; Dec. 4, '93; Jan. 2, '94.
- 25.—Davis, Howard Creek, Sierra Co.; North Yuba; Jos. Davis, Sierra City, Cal.; Dec. 4, '93; Jan. 2, '94; May 7, '94.
- 26.—Christmas Hill, Butcher Ranch, Placer Co.; American; Gilbert & McKinstry, Butcher Ranch, Dec. 5, '93.
- 27.—Walker, Igo, Shasta Co.; Cottonwood; Engle & Walker, Igo, Cal.; Dec. 8, '93; Jan. 31, '94; Feb. 26, '94.
- 28.—North Star, Mokelumne Hill, Calaveras Co.; Mokelumne; McGuire & Havens, San Francisco, Dec. 13, '93; Jan. 10, '94; Feb. 10, '94.
- 29.—Hustler, Cherokee, Nevada Co.; South Yuba; 210,000; J. Hustler, Patterson, Cal.; Dec. 17, '93; Jan. 23, '94.
- 30.—Green Mountain, Mokelumne Hill, Calaveras Co.; Calaveras; 170,000; J. W. Smith, Oakland, Cal.; Dec. 17, '93; Jan. 8, '94; April 11, '94.
- 31.—Noonday, Howard Creek, Sierra Co.; North Yuba; Jno. Egbert, Sierra City, Cal.; Dec. 26, '93.
- 32.—Pomeroy, Ono, Shasta Co.; Cottonwood; Engle & McGregor, Igo, Cal.; Dec. 26, '93.
- 33.—Union, La Porte, Plumas Co.; Yuba; D. W. Albert, Brownsville, Cal.; Dec. 26, '93; Jan. 31, '94; Feb. 26, '94.
- 34.—Weib Placer mine, Carbonade, Sacramento Co.; Cosumnes; 300,000; Columbia Gold Mining Co., Michigan Bar, Cal.; Dec. 27, '93; Feb. 10, '94; Feb. 13, '94.
- 35.—French Corral, French Corral, Nevada Co.; South Yuba; Kate Hayes Mining Co., San Francisco; Dec. 27, '93; Mar. 13, '94.
- 36.—Manzanita, Sweetland, Nevada Co.; Yuba; Kate Hayes Mining Company, San Francisco; Dec. 27, '93; May 1, '94; May 3, '94.
- 37.—Campo, Brownsville, Yuba Co.; Yuba; Tonsten & Campo, Brownsville, Cal.; Dec. 29, '93; Mar. 7, '94.
- 38.—Herring Ravine, Brownsville, Yuba Co.; Yuba; J. M. Wetmore, Brownsville, Cal.; Jan. 10, '94; Mar. 7, '94; Mar. 13, '94.
- 39.—Conduit Ravine, Brownsville, Yuba Co.; Yuba; W. W. and W. A. Lemon, Forbestown, Cal.; Jan. 21, '94; Mar. 27, '94.

- 40.—Motor, Brownsville, Yuba Co.; Yuba; Jas. Gordon, Brownsville, Cal.; Jan. 21, '94; Mar. 7, '94.
- 41.—Spring Gulch, San Andreas, Calaveras Co.; Calaveras; J. S. White, San Andreas; Jan. 31, '94; Mar. 13, '94; Mar. 17, '94.
- 42.—Crane Bros., Brownsville, Yuba Co.; Yuba; Crane Bros., Brownsville, Cal.; Feb. 5, '94; Mar. 7, '94; Mar. 10, '94.
- 43.—Indian Hill, Spanish Ranch, Plumas Co.; 175,000; Feather; Lazier & Eyrand, Spanish Ranch, Cal.; Feb. 6, '94.
- 44.—Badger Hill, Spanish Ranch, Plumas Co.; Feather; 2,000,000; E. B. Jacks, Meadow Valley, Cal.; Feb. 7, '94.
- 45.—Snow Bros., Newtown, El Dorado Co.; American; 161,333; Snow Bros., Newtown, Cal.; Feb. 13, '94; Apr. 3, '94; Apr. 9, '94.
- 46.—Green Meadow, Glencoc, Calaveras Co.; Mokelumne; H. B. Havens, San Francisco; Feb. 15, '94; Apr. 11, '94; May 1, '94.
- 47.—Grub Flat, Meadow Valley, Plumas Co.; Feather; Tucker & Brown, Meadow Valley, Cal.; Feb. 15, '94; Apr. 1, '94; Apr. 11, '94.
- 48.—Oriental & Tahoe, Randolph Flat, Nevada Co.; Yuba; Jas. Hackett, Rough & Ready, Cal.; Feb. 16, '94.
- 49.—Eureka Hydraulic, Placerville, El Dorado Co.; American; Pascoe and Grenben, Placerville, Cal.; Feb. 19, '94; Apr. 10, '94; Apr. 12, '94.
- 50.—Spanish Hill Hydraulic, Placerville, El Dorado Co.; American; El Dorado Water & Deep Gravel Mining Company, Placerville, Cal.; Feb. 19, '94; Apr. 10, '94; Apr. 12, '94.
- 51.—Spanish Hill Gravel, Placerville, El Dorado Co.; American; 750,000; Thos. Alderson, Placerville, Cal.; Feb. 19, '94; Apr. 10, '94; Apr. 12, '94.
- 52.—Cleveland, Scales, Sierra Co.; North Yuba; 256,000; Douglas Perkins, San Francisco; Feb. 24, '94.
- 53.—Dutra, Wilder & Co., Dobbins, Yuba Co.; Yuba; 4444; Lewis Wilder, Dobbins, Cal.
- 54.—Mitchell Hydraulic, Placerville, El Dorado Co.; American; R. & J. Blair, Placerville, Cal.; Mar. 7, '94.
- 55.—Stewart Hydraulic, Placerville, El Dorado Co.; American; 7790; Jno. Melton; Apr. 3, '94; May 1, '94.
- 56.—Richmond Hill, Onion Valley, Plumas Co.; Feather; 150,000; Good Hope Mining Co., Oakland, Cal.; Mar. 30, '94.
- 57.—Saw Pit Flat, Onion Valley, Plumas Co.; Feather; 150,000; Good Hope Mining Co., Oakland, Cal.; Mar. 30, '94.
- 58.—Onion Valley Creek, Onion Valley, Plumas Co.; Feather; 150,000; Good Hope Mining Co., Oakland, Cal.; Mar. 30, '94.
- 59.—Nip and Tuck, Bangor, Butte Co.; Feather; 5000; Dickhouse Bros., Bangor, Cal.; Apr. 9, '94.
- 60.—Concordia, Cromberg, Plumas Co.; Feather; 75,000; L. V. Tefl, Cromberg, Cal.; May 16, '94.
- 61.—Northern Placer, Cromberg, Plumas Co.; Feather; Northern Placer Mining Co., Cromberg, Cal.; May 16, '94.
- 62.—Schuyler, Igo, Shasta Co.; Sacramento; Thos. White, Igo, Cal.; June 5, '94.
- 63.—Hayes & Steelman, Sierra City, Sierra Co.; Feather; Philip Hayes, Sierra City, Cal.; June 12, '94.

Production of Gold in the United States.

In his annual report of the production of precious metals Director of the Mint Preston makes the statement that the production of gold in the world in 1893 was the largest ever known.

Mr. Preston estimates the approximate gold yield of the mines of the United States in 1893 at \$35,955,000, as compared with \$33,014,981 in 1892, an increase of \$2,940,019. The United States still holds the first place in the list of gold-producing countries.

Mr. Leech, Mr. Preston's predecessor, estimated the silver production of the United States in 1892 at 58,000,000 ounces, of the coining value of \$74,898,900. Mr. Preston, in the statement sent to Congress, follows the method by which the silver production of the United States had been estimated for a series of years prior to 1892. The result is a revision of Mr. Leech's figures, Mr. Preston placing the output of our silver mines in 1892 at 63,500,000 ounces, of the coining value of \$82,101,110, an increase over 1891 of 5,175,000 fine ounces, of the coining value of \$6,684,444. Our silver production in 1893 Mr. Preston estimated at 60,000,000 ounces, of the coining value of \$77,575,757.

The imports of gold into the United States during 1893 consisted of \$14,700,847 in foreign bullion; \$23,439,868 in foreign coin; \$578,186 in foreign ore.

Imports of United States gold coin aggregated \$34,621,673, making the total imports \$73,280,575.

The gold exports in 1893 were \$80,010,633. Of this sum \$71,995,129 was United States gold coin.

Foreign gold coin and ores of the value of \$7,518,153 were re-exported. The balance of the gold exports consisted of United States bars, domestic bullion, gold contained in copper matte and domestic ores.

The imports of silver into the United States for 1893 aggregated \$27,765,696.

The exports aggregated \$47,463,390, the exports thus exceeding the imports by \$19,697,694.

The consumption of gold in the industrial arts in the United States in 1893 is estimated at \$13,435,901, and of silver at \$9,634,277.

The most remarkable facts brought to light in the report on the production of the precious metals in 1893 are: That the world's output of gold in 1893 is the largest in history, amounting as it did to 16.08 per cent more than the annual average of the period of the greatest productiveness of the Californian and Australian gold mines; that the value of the gold product of the world in 1893 was only 8.77 per cent less than that of the average aggregate gold and silver production of the world in 1861-1865; that the average of the total gold and silver production of the world for the period of eight years—1866 to 1873—which just preceded the beginning of the depreciation of silver, was only \$35,309,000 more than that of the gold output alone of 1893. There is also a great probability, amounting almost to a certainty, says Mr. Preston, that the value of the world's output in 1894 will equal that of both metals in the years 1861-65, and in 1895 or 1896 it will equal that of the years

immediately preceding the beginning of the depreciation of silver, that is, the average of 1866-73, inclusive; and that in 1897 it will be greater than such average; that the value of the gold alone available in 1893 for monetary purposes was greater than the total value of both gold and silver available for monetary purposes in the years just preceding the beginning of the depreciation of silver.

Concentrates.

THE Horn Silver mine is weekly shipping 300 tons of ore. TWENTY-NINE Montana mines have paid dividends to date aggregating \$28,034,727.

THE April gold output of the Witwatersrand, South Africa, district was 168,745 ounces.

'Tis reported around Sutter creek that Alvinza Hayward is about to buy the Gover mine.

THE Ogdan-San Juan Mining Company has incorporated at Ogden, Utah. Capital stock, \$40,000.

THE bill for the extension of one year on the assessment work on mining claims has passed the House.

THE *Record* says Ouray county, Col., is employing 500 more miners at this time than six months ago.

SUPERINTENDENT WAGOONER has begun crushing ore from the Granits Hill mine at the Crown Point mill.

THE hydraulic mine on Hungarian Hill owned by the Plomss Imperial Gold Mining Company is in operation.

FRANK POWELL, a mining superintendent at La Joya, Oaxaca, Mexico, was killed by three Indians recently.

CHARLES W. STEELE, manager of the Independence mine at Colorado Springs, who accidentally shot himself, is dead.

THE Lovelock *New Era* has been moved to the new mining camp, Kennedy, and will begin publication immediately.

THE gold receipts at the Denver Mint for the month of May were \$431,934, as against \$99,736 for the same month of 1893.

THE Kansas City & Cripple Creek Mining Company has been incorporated at Cripple Creek, Col. Capital stock, \$1,000,000.

THE Denver & Gueniesine Mining Co. has been incorporated at Denver. Capital stock, \$125,000. The mines to be worked are in Mexico.

MAJ. L. C. MOSELMAN has sold a half interest in the Nugget and Sunrise mines, San Bernardino county, for \$40,000, and stock for \$15,000.

THE new quartz mill at the Livingston mine, San Bernardino county, is in operation. The clean-up of the first five tons of ore netted \$372.

THE Old Dominion Copper Company of Globe, Arizona, closes down to-day "till Lake copper recovers to ten cents"—a remote contingency.

WYOMING men think they have discovered near Atlantic a whole mountain of copper ore bigger and better than the Anaconda, Montana, deposit.

THE Pliocene Mining Company, to operate mines in Shasta county, has incorporated with capital stock of \$100,000. Sacramento is the principal place of business.

A NEW deposit of anthracite coal has been discovered near Ouray, Colorado. In 1892 the anthracite production in that State was 62,303 tons, all from Gunnison county.

IT is but recently Lucky Baldwin sold the Gold Mountain mine to Burt Dooper for \$40,000. The latter is reported to have bonded the mine to an English company for \$500,000.

CRIPPLE CREEK's latest infiction is from a plague of caterpillars. They have eaten the leaves off the trees, fill level the ruts in the roads, and are two feet deep in old prospect holes.

NO. 3 SHAFT of the Tamarack copper mine, in Michigan, has reached a depth of 4320 feet. It is thought to be the deepest mining shaft in the Union. Shaft No. 2 is only 175 feet behind No. 3.

THE \$32,000 attachment on the Sutro tunnel for legal services by San Francisco attorneys, may, it is thought, occasion a change in the control of the tunnel, which cost \$7,000,000 to bore.

THE Omaha Mining Company declared two dividends this month—Nos. 27 and 28, and for 15 cents per share each. Superintendent Mainhart says that the mine is looking as well as ever.

THE twenty-seven miners who attacked the deputy sheriffs on Bull Hill in February are being tried in Colorado Springs. THE *Record* says the criminal docket of El Paso county is a hummer.

C. A. STOCKTON, President of the Standard Gold and Silver Mining Company, who was charged with forgery, has been freed from custody, and will sue for damages the parties causing his arrest.

WORK on the China Creek mines of British Columbia is being resumed. The King Solomon mine is worked by a large party. A few days ago a button was taken from the mine valued at \$380.

ANOTHER alleged gold discovery is reported at Red Rock, thirty miles from Mojave. This time one man secures \$170 in one day by the dry washer process. Water is said to be had "in unlimited quantity" at the Bonanza mine.

THERE is considerable mining interest developing in Lane county, Oregon. In a district 25 miles east of Cottage Grove there is some attention given to gold quartz discoveries, and there are two properties there that are milling \$100 ore.

CREDITORS of the Gover Mining Company of Amador have petitioned to have the corporation declared insolvent. The petitioning creditors complain that the corporation has permitted its property to remain under attachment since May 25th.

THE Seattle *Post-Intelligencer* says that if you pound a \$20 gold piece into a lump it is still worth \$20, while if you pound 20 silver dollars into a lump they are worth less than \$10. It might have added that if you pound a \$20 greenback into a lump it is worth nothing at all.

THE *Dispatch* hears that a heavy lawsuit is brewing between the Argonaut and Kennedy Mining Companies. The former

claims that the latter has been operating within its lices to the extent of some 40 feet, and it is said will demand restoration of the ore taken from rock extracted therefrom.

AN interest in the Mercur Gold Mining and Milling Company has been sold by its owner, J. H. Hedges, one of the former directors of the company, for \$150,000. He owned 23,000 shares of the capital stock, and his holding was purchased by President Dern and two of the other stockholders.

HOONOO is lively at present. It is within the Government reserve, which embraces the headwaters of the Palouse, the Potlach and the St. Mary's. Three bears were lately killed there in one day. There are over 100 miners there, and they get fifty cents to the pan in the ground sluice, so it is said.

A SINGULAR accident happened near Boulder, Montana, last Tuesday. A rock weighing a ton was loosened by the heavy rains and, crashing down the mountain, struck square over the mouth of the shaft of the Katie mine and fell to the bottom, mangling two miners working there. The shaft was a hundred feet deep.

THE old Pisco gold quartz mines, near Yuma, comprising the Mars, Venus, St. Georges and Goshen mines, including the 15-stamp quartz mill built by the late David Neahr, and which cost \$40,000, has been sold by J. M. Meudevil, agent for the owner, D. W. C. Jones of New York, to Col. S. K. Allen and his associates, a Chicago syndicate of capitalists, for \$125,000.

F. CHAPPELLET has recently acquired the El Encino mine, containing over a mile of the blue gravel channel in Chile gulch, three and one-half miles south of Mokelumns Hill. A drain tunnel is to be run 1000 feet. The company owns one-half mile of the Chile Gulch below the mine location for tailings, and expects to have the tunnel finished by November 1st.

THE Amador county assessor has raised the assessment this year of a few of the mines which have been idle for many years and has been assessed at a nominal figure. The Hector of Sutter Creek has been raised from \$12,000 to \$20,000; the Consolidated Amador Quartz Mining Company, this side of Sutter Creek, from \$5000 to \$21,400; the Lincoln Gold Mining Company, just beyond Sutter Creek, from \$5000 to \$18,200.

THE Idaho *Avalanche* says: Exaggerated reports of the prosperity of Owyhee have been circulated, which is leading to an uncalled for influx of working men, who find upon arrival that the chances for employment are not as numerous as they are anticipated. There are now more miners and laborers in Silver City and DeLamar than can obtain work. Living is high there and parties without resources should keep away.

THE Butte, Anaconda & Pacific Railroad will be built this season into Granite, Ravalli and Missoula counties, Montana. Work will be begun next week. It is thought three thousand men will be put to work. The route is via Phillipsburg and down the Shalako into the Bitter Root valley to a point twelve miles south of Missoula, where it will cross the Bitter Root river, entering Missoula across the flat southwest of the city.

THIS advice is from the Winnemucca *Silver State*: Don't rush to Kennedy for employment at wages. The labor market is supplied. If you have elastic muscles, bacon and beans, there is plenty of room for finding a good mine. A large scope of inviting country lays all around awaiting your coming, and with industry you are liable to find it rich. Industry alone found Kennedy, and industry is the only thing that pays down there.

THE Georgetown *Courier* unkindly says it is stated that several mines at Cripple Creek have been operated on a plan very similar to that of the Holy Moses at Creede. Georgetown miners state that they have seen trains of cars leave Creede with ore from the Holy Moses, which was dumped along the track some miles away. This would immediately be followed by an announcement in the Denver papers of "Twenty cars of high-grade ore shipped from the Holy Moses yesterday!" Of course the owners knew nothing about this. Their business was to sell the mine and unload stock, in which they were eminently successful, thanks to the immense output of hallast.

THE following incorporations have filed articles with the Secretary of State at Sacramento:

Stanley Mining Company, San Francisco. Capital stock, \$100,000, with the following directors: G. W. Osborn Jr., G. W. Osborn, San Francisco; W. C. Stanley, Canyonville, Or.; P. H. Kane, Oakland; N. A. Brady, Mountain View, Cal.

The Granite Gold Mining Company, Sacramento. Capital stock, \$600,000, with Kate L. S. Cummings and George W. Cummings, of Placerville, and William Schaw, J. O. Coleman and H. R. Martin, of Sacramento, as directors.

Loris Gold Mining Company, Pasadena. Capital stock, \$300,000, with the following directors: George W. McGee, Chicago; Edward Kennedy, J. O. Macament, Jesse H. Dickey, Newell W. Bloss, Pasadena.

REPRESENTATIVE SWEET of Idaho has secured the passage of his bill by the House to amend the laws relating to mining claims. This bill is similar to the bill introduced by Bell of Colorado, which passed the House at the extra session, except that Bell's bill suspended the operation of the law requiring \$100 worth of work to be performed annually on mining claims located since May 10, 1874, for the year 1893, while Sweet's bill suspends the law for 1894. It was claimed that Bell's bill passed the House so late in the year as to be of little benefit to miners. There was a great deal of opposition to the bill from sections in which mining corporations own a large number of claims, and South Dakota and the Second Congressional district of Colorado were exempted from the provisions of the law.

CAENA'S CREEK, emptying into the Columbia river about 30 miles north of Revelstoke, is the first of the famous gold creeks crossed by the trail leading to the Big Bend gold country. The Big Bend of the Columbia is that portion of the river lying north of the Canadian Pacific Railway, which crosses the Selkirk mountains from Donald to Revelstoke, the river forming two sides of a nearly perfect triangle, with the railway as its base, Canoe river being at the northern apex. Gold abounds in nearly all the creeks flowing into the Columbia in this bend or triangle, but the best finds have been made on creeks flowing into the big river on the western leg of the triangle, where it is flowing southward after doubling back on itself from the sharp turn at Canoe river. Chief among these tributaries is Gold stream, so called from the fact that some two or three million

dollars' worth of gold nuggets and coarse grains were taken out in the boom days of '65 and '66. At the present time French and McCulloch creeks, both flowing into Gold stream, are being profitably worked by several small companies, notably the Consolidation and Vandal claims on French creek, the former averaging about \$1400 a month for each man employed for the last ten months. Carne's creek derives its name from a miner named Carne, a Cornishman, who is reported to have taken out a lot of money, variously stated to have been all the way from \$1500 to \$15,000, from the first half-mile of the creek from its confluence with the Columbia.

THE Georgetown *Courier* grows reminiscent, and says: About six years ago J. F. Seymour, J. L. Sanderson and W. G. Pell, owners of the Slide mine in Boulder county, employed Ernest LeNeve Foster to make a report upon the mine, showing it to be worth \$750,000. Mr. Foster, having had experience in making a similar report upon the Astor mine, readily undertook the job, looked into his crystal sphere, and made a report which evidently convinced some Loudon bankers that the property was cheap at three-quarters of a million of dollars, so they purchased it. Whether they are satisfied with the bargain to-day, or whether they are in the boat with the Astor owners, has nothing to do with the suit that Mr. Foster has just brought against the original owners of the Slide mine for \$25,000, for making that report.

THE approximate gold yield of the United States in 1893 was 1,739,325 fine ounces, valued at \$35,955,000, as compared with 1,597,100 fine ounces, valued at \$33,014,981, in 1892. The United States still holds first place in the gold-producing countries of the world. In '93 the silver output was 63,500,000 fine ounces, of the coining value of \$82,101,110. The total African product in '93 was \$29,305,755. The world's production of the precious metals in 1892 was \$146,297,600 in gold; in silver, \$197,230,500, showing an increase over 1891 of \$15,647,600 in gold, and in silver of \$20,274,600. The world's production of gold in 1893 is estimated at \$155,521,700, showing an increase over 1892 of \$9,224,100. The world's silver output of 1893 was \$207,895,400, an increase over that of 1892 of \$10,664,900. The world's output of gold in 1893 is the largest in history. The value of the gold alone available in 1893 for monetary purposes was greater than the total value of both gold and silver available for monetary purposes in the years just preceding the beginning of the depreciation of silver.

Clipped and Condensed.

MORE attempts are reported against the Russian Czar's life.

THE deficit for the fiscal year ending to-day is estimated at \$74,500,000.

THERE have been over 2,000,000 admissions to the San Francisco Exposition to date.

TWO experts will next week conduct the annual inspection of the San Francisco mint.

THE Northwest Interstate Fair will open at Tacoma, Wash., August 15th and close November 1st.

ONE HUNTER AND EIGHTY miners lost their lives by an explosion in a coal pit near Glamorgan, Wales, last Saturday.

THE latest from the tariff bill show that sugar, coal and iron will be protected. Wool and lumber will probably go on the free list.

ANLT-GRNL. TAASRAY of Colorado was tarred and feathered by masked men at Colorado Springs last Saturday night, and warned not to return under penalty of death.

CAENOT, the President of the French republic, was assassinated at Lyons, France, last Sunday night by an Italian anarchist. He plunged a dagger in President Carnot's heart, the wound speedily proving fatal. M. Casimir Perrier was on Wednesday last elected as his successor.

A. R. HAMMON, with a party of twenty-one miners, left New York yesterday to prospect in Mashonaland and other South African countries. After arriving at Cape Town they expect to go to Beria, on the east coast, 1600 miles to the north, and will travel 600 miles inland to the new gold fields.

Personal.

J. A. CONLON has been re-elected superintendent of the Conlon Mining Co.

A. A. GIONAN of the Texas Hill mine, El Dorado, is in the city to buy additional machinery.

W. F. BREMAN of Globe, Arizona, is in the city buying machinery for his gold-mining properties near Globe, Arizona.

THE following is from the New York *Engineering and Mining Journal*:

A company has been registered in London under the name of "The Sherlock Gold Mines, Limited," to acquire the Sherlock mines, which comprise the W. Y. O. D., Omaha, North Star and Wisconsin mines, situated in the Whitlock mining district, Mariposa county, California. The capital is £60,000 in £1 shares. The directors are Messrs. C. H. Tindal, W. B. Smlth, W. Chatwin, F. Spencer and D. L. Baumgarten.

There is a Whitlock mining district in Mariposa county, with several good mines worthy of development by capital from London, or anywhere else, but the mines named above are in Nevada county, and so far as known are not for sale. London investors would do well to make inquiry before picking up any of that \$300,000 stock on the strength of the names given.

THE miners of Mercur, Utah, resolved as follows: "That it is the sense of the miners of this meeting that it is impolitic and against the real interest of the miner and the mining industry for Congress to exempt mining claims from manual labor." The resolution of the Mercur miners would have more force if they adduced some good argument in favor of the assumption. Men who have given the subject considerable study think just the other way.

Santa Catalina.

As the mainland of California advances in population and importance in the eyes of the world, the attractions of its environment naturally become better known and appreciated. This remark is especially true with reference to the picturesque islands which lie off the coast of southern California and add so much to the beauty of the ocean views westward from the mainland. Until within the last decade these islands were only viewed from this distance, except by fishermen and goat-herders and scientific explorers. Their characteristic charms of scenery and climate were unknown to the public, except by hearsay. Recently, however, there has been an enterprising effort to make some of the islands more accessible and available for public enjoyment, and at present Santa Catalina island may be counted among the leading popular resorts of the State.

The views on this page give some suggestion of the delights of Catalina—the variety of its scenery, which includes both peaceful bays with bathing beaches; bold, rocky shores, against which at times the waves dash with charming fury; and picturesque canyons and dells, with lovely limpid streams and waterfalls. All these features are embodied in the composite engraving which we present, and which weaves together the best parts of half a dozen photographs.

Santa Catalina island lies in the Pacific ocean, about 25 miles southwest of San Pedro harbor, in Los Angeles county. It is approximately 25 miles in length, and perhaps 6 miles in width at its widest part, but throughout its greatest length it is but 1 to 3 miles from side to side. This gives the island a long shore line and plenty of room for the visitor who likes long walks or sails. There is much of interest, too, both in its land and water resources. The water teems with fish, and the land abounds with minerals of great interest and beauty.

Catalina is not only a resort of no little prominence, but is fast coming to the front by adding wealth to our southern country. Valuable quarries of soapstone and serpentine ornamental and building stone have been opened up and are causing great interest among the building community. The serpentine stone is very beautiful, having, on account of its different colored veins, the appearance of onyx. The soapstone quarries are situated in a very romantic part of the island, and it adds to their interest to find old excavations where the Indians quarried soapstone to make culinary utensils more than 150 years ago. Thus early did Catalina pay tribute to the mainland.

Both summer and winter the island is a charming resort. Its climate is much milder than the adjacent mainland. All winter long Catalina is lovely, with its mountains and valleys of green, its still, crystal-like waters, and its beautiful little city of Avaloo, which has an appearance of its own, climate of its own and natural advantages of its own, unlike any place but Avalon. No frosts visit the valley in which Avalon is built, so bananas and other tropical fruit grow there on luxuriant trees, bearing no signs of cold weather.

In calculating "exact time" at the national observatory at Washington, the astronomers do not, as is generally supposed, use the sun as the basis of their calculations. Such deductions are made from relative positions of "fixed stars."

New Process of Gold Extraction.

For some time past a party of Boston capitalists have been down in Nova Scotia establishing a mill on the premises of the Winsor Foundry Company, in Winsor, for the purpose of demonstrating the value of a new process of extracting gold from rock. It is about three months since the men began operations, and during that time they have had their mill at work, and the promoters are of hope. If their process will do what is claimed for it, it is a remarkable thing indeed, and they claim that it has thus far done the work expected.

The new process is a combination of chlorination with amalgamation. The process of extraction is this: The mercury is first combined with salt by the action of elec-

forming the amalgam—another evidence of the power and utility of manufactured lightning.

A New Mexican Mining Law.

A new gold-mining law has been passed by the Mexican Congress.

Contracts will be drawn in the shape of concessions granted by the executive, provided that the data obtained by him justifies him in thinking that actual gold deposits exist within the zone to be explored.

Gold deposits are considered to be not only those of an alluvial character, but those mixed with other ores wherein the yellow metal shall be found in greater proportions as well. As soon as the nature of the ore shall tend to vary from the required average, all contracts will be rescinded.

The concessionaires can, within the area of their zone, acquire the unclaimed mining properties or incorporate in the concession any mining properties they may hold prior to the issuance of their contract. They will be granted exploration privileges that will enjoin any other individual or company from making explorations for any other class of ores, such privilege to last only six months, and not again until the lapse of two years.

All necessary paraphernalia for exploration purposes may be entered free. A rebate from the regular mining tax for a period of ten years, or an exemption from federal taxation for a same period, are the privileges.

In the first three years a capital of \$500,000 must be invested in the enterprise; this is to be increased to \$1,000,000 during the succeeding five years. As guarantee of good faith a bond of \$10,000 must be deposited, to be refunded when evidence is furnished that \$200,000 has been invested.

The concessionaires must establish within two years from date of concession a reduction works capable of handling 400 tons of ore weekly, or some similar establishment of equal value.

THE bill introduced by Senator Power of Montana to amend Section 2324 of the Revised Statutes of the

United States, relating to mining claims, is as follows:

SECTION 1. That the provisions of section numbered twenty-three hundred and twenty-four of the Revised Statutes of the United States which require that on each claim located after the tenth day of May, eighteen hundred and seventy-two, and until patent has been issued therefor, not less than one hundred dollars' worth of labor shall be performed or improvements made during each year, be suspended for three years, so that no mining claim which has been regularly located and recorded, as required by the local laws and mining regulations, and is owned by a bona fide resident of the State or Territory in which said claim is situated, shall be subject to forfeiture for non-performance of the annual assessment for the years eighteen hundred and ninety-four, eighteen hundred and ninety-five and eighteen hundred and ninety-six: Provided, That the claimant or claimants of any mining location, in order to secure the benefits of this act, shall cause to be recorded in the office where the location notice or certificate is filed, thirty days before the expiration of time for completion of the annual assessment work on said claim, a notice that he or they, in good faith, intend to hold and work said claim: Provided, however, That the provisions of this act shall not apply to the State of South Dakota.

SEC. 2. That this act shall take effect from and after its passage.



SCENES ON SANTA CATALINA ISLAND, OFF THE COAST OF LOS ANGELES COUNTY.

tricity, forming a mercurial hydrate of sodium. This is combined with acids, reducing it to such strength that eight ounces of it will impregnate 400 gallons of water. This water is kept in a tank and fed to the mills as the ore is being ground. The ore is ground in this solution, and the instant a particle of rock is parted and the gold relieved, the precious metal instantly comes in contact with the solution and the iron rollers, which relieve the gold by crushing the rock, precipitate the chlorides into the solution, setting the mercury free right at the point where the gold is liberated, causing instantaneous amalgamation. The particles of gold, which are covered with a thin film of mercury, are forced through a large body of metallic mercury, and are there arrested as amalgam. After this the gold is treated in the ordinary manner.

It is claimed that from a barrel of ore sent from Georgia, to be tested in this mill, the amount of precious metal extracted from it was equivalent to \$34 per ton, while tests made by the ordinary stamp mill revealed only \$2 per ton. It is said that a test made with rock that has been used for railroad ballast on one of the roads in the provinces produced gold enough to pay the expenses of working. The real secret of the whole process is the utilization of electricity in

The Mineral Hydrocarbons.

Their History, Geography, Geology, Physical and Chemical Properties and Uses.

NUMBER V.

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We find sufficient in history to justify the opinion that the Oracle at Delphi was simply an emanation of natural gas or the vapor of petroleum, which is equivalent to the same thing. The following was published in the London *Lancet* in 1889:

NAPHTHA INTOXICATION.

In several large factories in Germany, especially in India rubber factories and establishments for cleaning India rubber, peculiar morbid symptoms have lately been observed. The faces of many of the girls, who had not left the factory during the day, became flushed and swollen in the evening, and they could not walk steadily. An examination of their clothes and of the work-rooms for kerosene, opium, etc., yielded no result, till an accident led to the solution of the mystery. In these factories naphtha is used in large quantities, and kept in special boilers closed against the air. The girls had succeeded in getting keys to the boiler valves, and soon, learning the intoxicating effect of naphtha, were in the habit of sinking unobserved to the reservoirs to inhale the poison, which threw them into a state of happy forgetfulness and conjured up a thousand sweet dreams of wealth, splendor, happiness, etc. The secret was revealed by a novice, who made too deep an inhalation and fell into hysterical convulsions.

This, in connection with the following quotations from ancient writers, makes a strong argument in favor of such an opinion:

Diodorus Siculus (Book 16, chap. VI) thus refers to the Delphic Oracle: * * * "It is reported that this oracle was first discovered by some goats, for which reason such creatures are sacrificed by the Delphians when they come to inquire of the Oracle. The discovery is related in this manner: There was an opening or gulf in the earth at that place, now called 'the adytum of the temple.' About this the goats straggled as they were feeding, for at that time they of Delphos had no religious regard for the place. It often happened that when any goat came near the gulf and looked down it would fall to leaping and dancing in a wonderful manner and make an unusual noise, far different from that at other times. A shepherd, wondering at the novelty of the thing, drew toward the place to learn what was the cause, and, looking down, he acted the same part with the goats; for, as they were moved and acted as by some enthusiasm, so he was likewise inspired with a spirit of prophesy. The news presently spreading abroad among the inhabitants how wonderfully they were affected that looked down into the chasm, many flocked to the place and out of curiosity made experiments, and as many as came near always acted with a spirit of divination. For these reasons the place was counted the residence of some oracle. For a time, therefore, it was a practice that those who had a desire to know future events would approach the den and there return answers of things that were to come, one to another; but whereas many, through an excess and transport of mind, would leap into the gulf and so were never seen more, it was judged advisable by the inhabitants, to avoid like danger for the future, that some one woman should be consecrated prophetess, and that by her the answer of the Oracle should be delivered, and that an engine should be made for her whereon she might sit, and by that means be inspired without any danger and give answers to them that counselled with her concerning future events. This machine was called the 'tripode,' whose figure and shape almost all the tripodes of brass made up to this day do imitate." * * *

Lucan (Pharsalia, Book 5) relates how Apollus consulted the Oracle of Delphi, which had long been silent, as to the result of the war in which he was engaged. The Oracle is described: He tells how the Temple was opened by Phemonoe, the priestess, who endeavors to persuade Apollus not to inquire into the future. He forces her, however, to seat herself on the tripod. The frenzy of the priestess is graphically described. The following was the ambiguous reply of the Oracle: "O Roman, thou dost escape from the vast threatenings of the war free from dangers so great, and alone shalt thou take thy rest in the wide valley of the Eubœan Quarter." "Then"—in the words of Lucan—"smitten by the breast of the prophetess, the doors open, and, hurried on, she leaps forth from the Temple. Her frantic fit still lasts, and the god, whom as yet she has not expelled, remains in her, not having said the whole. She still rolls her fierce eyes, and her looks wandering over the whole sky, now with timid, now stern with threatening features, a fiery blush tints her face and her livid cheeks, and a paleness exists—not that which is wont to be in one who fears, but inspiring fear; nor does her wearied heart find rest, but as the swelling sea after the hoarse blasts of Boreas, moans; so do the silent sighs relieve the prophetess, and while from the sacred light by which she has beheld the fates, she is being brought back to the sunshine of ordinary day. Shades intervening, come on, Pæon sends Stygian Lethe into her entrails to snatch from her the secrets of the gods. Then from her breast flies the truth, and the future returns to the tripodes of

Phœbus; and, hardly come to herself, she falls to the ground."

At the oil centers in Pennsylvania, to counteract the natural tendency of crude petroleum to evaporate, thinned covers of wood are placed over the oil tanks. These are each provided with a man-hole opening. When the tanks are nearly empty, the smell of gas and oil is very strong, and it sometimes happens that the bodies of men or boys are found, who, in looking into the tanks, have been overcome by the vapors and lie with their faces near the openings. In cases where the effects are not fatal, a kind of intoxication is experienced similar to that described by Diodorus and Lucan, as quoted above.

It is difficult at this distance to understand why the ancients invariably attached superstitious importance to natural phenomena, and the classical scholar is astonished when he reads of the vast treasures donated to this oracle by Crœsus and other wealthy monarchs, a detailed statement of which reads like a fable, although admitted as truth.

Diodorus Siculus (Book 2, chap. I) thus refers to a spring near Babylon which emits a deleterious gas: "Near this fountain there is a spring, not big, but very fierce and violent, for it casts forth a sulphurous and gross vapor which suddenly kills every living creature that comes near it, for the breath being stopped a long time and all power of respiration taken away by the force of the exhalation, the body presently swells so that the parts about the lungs are all in a flame."

Pliny, in his chapter on "Vents in the Earth" (Natural History, Book 2, chap. XCV) refers to gaseous emanations: * * * "The exhalation of deadly vapors, either emitted from caverns or from certain unhealthy districts; some of them fatal to birds alone, as at Soracte, a district near the city; others to all animals except to man, while others are so to man also, as in the country of Sinuessa and Puteoli. They are generally called vents, and by some persons Charon's sewers, from their exhaling a deadly vapor. Also at Amsanctum, in the country of the Hirpini, at the temple of Mephitis, there is a place which kills all those who enter it. And the same thing takes place at Hierapolis in Asia, where no one can enter with safety except the priest of the great Mother of the Gods. In other places there are prophetic caves where those who are intoxicated with the vapor which rises from them predict future events, as at the most noble of all oracles—Delphi." * * *

Book 2, chap. CX-CXI: "In Nymphæum there issues from a rock a fire which is kindled by rain. It also issues from the waters of the Scantia. This is indeed a feeble flame, since it scarcely passes off, remaining only a short time on any body to which it is applied. An ash tree, which overshadows this fiery spring, remains always green. * * * The plain of Babylon throws up flame from a place like a fish pond an acre in extent. * * * There is also the crater of Nymphæum which is always burning, in the neighborhood of a cold fountain, which, according to Theopompus, presages dreadful calamities to the inhabitants of Apollonia. It is increased by rain and it throws out bitumen, which, becoming mixed with the fountain, renders it unfit to be tasted; it is at other times the weakest of all the bitumens."

The following account of the burning gas emissions at Modena, northern Italy, is from "Travels in the Two Sicilies," by Spallanzani, 1788—Introduction, Vol. I:

"The fires of Barigazzo, which burn on the Apennines of Modena, have long been known. These consist of groups of feeble flames collected in a narrow space which rise above the earth, are almost always visible, and if by chance they become extinct, may be rekindled by bringing a small flame to the spot where they were. The accounts of them are so few and so defective that at most they can only serve to compare the present state of these flames with what it once was. The light afforded by modern physics enables us to affirm without further examination that the cause of this feeble fire must be hydrogenous gas (or inflammable gas). I made a journey to Barigazzo purposely to ascertain this, and found it to be a fact. In that vicinity there are six other similar fires at the present time, only known to the Alpine peasants, all originating from the same principle. * * * And here I must observe, by the way, that having made at Barigazzo an excavation of some depth and size, in order to obtain the earth pure, the fires multiplied so much and became so powerful that after I had left the place, the hollow was employed as a furnace for lime, and limestone as perfectly burnt as in furnaces prepared for that purpose. * * * It is certain from authentic documents that these fires have burned for a century and a half."

It has been asserted that the burning gas spring at Sulphur creek in Colusa county, California, will re-ignite if extinguished. If this be so, the fact may account for gas fires burning so continuously.

Gas wells are common in China and have been in use

for many centuries. The gas has been from the earliest times conducted in pipes of bamboo and burned as at present in the United States.

Mines on the Lower Colorado River.

Taylor D. MacLeod in Yuma Times.

Castle Dome.—The mines are situated on the flat mesa and rolling hills near the base of a lofty mountain range, here forming a horseshoe curve. A system of three parallel veins cuts through the country at the outer points of the curve with an N. W. and S. E. strike, and at an elevation above sea level of 1800 feet. They are readily accessible over hard, level mesa roads and "wash," 20 miles from Castle Dome Landing on the Colorado river, thence 30 miles to Yuma by steamer or wagon road; or to Gila City, a station on the S. P. R. R., all road and one handling of ore saved—a distance of 30 miles. Present transportation rates to Castle Dome Landing by team are \$6; thence by steamer and rail to San Francisco \$9, or a total of \$15 per ton; Gila City \$7, team \$8, rail \$15.

The country formation is porphyry. The mines lie in a contact of porphyry and granite, with a dip generally to the east of 45 degrees. The ledges are from two to four feet wide. The vein stuff is decomposed porphyry. The mineral, argentiferous galena and lead carbonates, are in a gangue of fluor and calcspar, with considerable iron oxide. It is a clean smelting ore, carrying no deleterious base material. It is cheaply mined, but little powder required, and that of a "slow," low-grade kind. The ore ranges in value from 20 to 90 ounces silver and 60 to 80 per cent lead per ton.

These mines, under the old regime, yielded steady, remunerative shipments for about 20 years, when work was stopped at a water level 300 feet in depth. The veins of this district in no instance pinch out; they continue and in ore where work was suspended. It probably cost too much at the then price of lead to mine and extract ore 200 and 300 feet deep by hand windlass or whim, though this is the present way of hoisting. Advised by some of the old-time workers in these mines of the location of favorable indications of ore, the present owners have uncovered large ore bodies in virgin ground above water level, and the result is a steady and assured output.

The number of men actually employed at the mines is above 100, and three ore teams are constantly on the road. The Hodges Bros. are operating Washington group; Frank Avila and John Stoffela are shipping from the old Pocomontas and Arkansas mines, and a large force is on Frank Vomocil's Railroad group of eight claims.

Eureka.—Twelve miles north of Castle Dome Landing is found the Eureka district and mines. Extensive work was done here before the advent of the railroad to Yuma. It is exceptionally situated for cheap mining. The outside mines are not one mile from the river bank, and those now working not one-fourth of a mile off.

Here the mountains rise abruptly to a greater height than any other range on the lower river, thus allowing economical working by tunnel. The formation is block slate. The ledges are of a width of two to five feet, between firm walls with a strike N. W. and S. E. Gangue matter is of limestone and quartz and a clay gouge or casing on the hanging wall, dipping to the east and under the mountain at 46 degrees. The ore is silver-lead with seams and pockets of iron oxides, and "free" until water level is reached, when some zinc blende is found in seams paralleling the galenite. Water is found at river level. A hand pump handles the inflow in shaft sinking. At present, as in the past, there is plenty of virgin ground to exploit above the water level, that is responding favorably to tribute workers now on the ground. The ore averages 50 ounces silver and 60 per cent lead per ton. Sufficeth it to say that the Vomocil group, with the Mina Alta, an outside vein strong in ore, comprise the mines of this district. They have supported 60 to 100 people, and shipments are regular. Below Eureka proper, one mile away, Charlie Thiesen has a claim from which he has made shipments in times past.

Azure King Group.—Two miles north of Eureka and half a mile from the steamer landing is situated the Azure King group of six claims. This is a gold-silver-copper proposition, was worked extensively, and ore shipped via the river and Gulf of California to San Francisco in an early day. There are numerous shafts on the vein from 20 to 60 feet deep, in which the notched pole ladders yet in the shafts show the primitive method used in packing out ore and waste on the backs of men in days long since. The mines are situated just within the porphyry mountain range that parallels the river.

The veins have an N. W. and S. E. trend, are two to six feet wide, with a quartz gangue in the talcose-schist vein matter. The copper occurs as a chalcite copper glance; tetrahedrite, gray copper, sparingly; cuprite, red copper; and generously of malachite and azurite, or green and blue carbonates of copper—hence the name.

Crude hand sorting of the vein as it runs returned an

assay value of: No. 1—gold, \$47.54; silver, 15 ounces; copper, 12 per cent. No. 2—gold, \$24; silver, 16 ounces; copper, 13 per cent. It is safe to assume an average value of \$12 gold, \$10 silver and 10 per cent copper to the ore in place.

These claims will be worked at a profit some day, as they are exceptionally easy of access and free, containing not a trace of arsenic, and can be cheaply mined and treated on the ground. Handsome specimens containing coarse free gold imbedded in malachite are not uncommon.

The Haunted Swing.

A good many of the hundreds of thousands who visited the Midsummer Fair in this city were considerably mystified by the apparent "upside down" sensation given them in the "haunted swing."

An article in the current number of the *Scientific American* explains the trick: Those who are to participate in the apparent gyrations of the swing—and there may be quite a number who enjoy it simultaneously—are ushered into a small room. From a bar crossing the room, near the ceiling, hangs a large swing, which is provided with seats for a number of people. After the people have taken their places, the attendant pushes the bar and it starts into oscillation like any other swing. The room door is closed. Gradually those in it feel after three or four movements that their swing is going rather high, but this is not all. The apparent amplitude of the oscillations increases more and more, until presently the whole swing seems to whirl completely over, describing a full circle about the bar on which it hangs. To make the thing more utterly mysterious, the bar is bent crank fashion, so that it seems demonstrably impossible for the swing to pass between bar and ceiling. It continues apparently to go round and round this way, imparting a most weird sensation to the occupants, until its movements begin gradually to cease and the complete rotation is succeeded by the usual back-and-forth swinging, and in a few seconds, as the children say, "the old cat dies." The door of the room is opened and the swinging party leave. Those who have tried it say the sensation is most peculiar and the deception perfect.

The illusion is based on the movement of the room proper. During the entire exhibition the swing is practically stationary, while the room rotates about the suspending bar. At the beginning of operations the swing may be given a slight push; the operators outside the room then begin to swing the room itself, which is really a large box journaled on the swinging bar, starting it off to correspond with the movements of the swing. They swing it back and forth, increasing the arc through which it moves until it goes so far as to make a complete rotation. The

operatives do this without special machinery, taking hold of the sides and corners of the box or "room." At this time the people in the swing imagine that the room is stationary while they are whirling through space. After keeping this up for some time, the movement is brought gradually to a stop, a sufficient number of back and forth swings being given at the finale to carry out the illusion to the end.

The room is as completely furnished as possible, everything being of course fastened in place. What is apparently a kerosene lamp stands on a table, near at hand. It is securely fastened to the table, which in its turn is fastened to the floor, and the light is supplied by a small incandescent lamp within the chimney, but concealed by the shade. The visitor never imagines that it is an electric lamp, and naturally thinks that it would be impossible for a kerosene lamp to be inverted without disaster, so that this adds to the deception materially. The same is to be said of the pictures hanging on the wall, of the cupboard full of chinaware, of the chair with a hat on it, and of the baby. All contribute to the mystification. Even though one is informed of the secret before entering the swing, the deception is said to be so complete that passengers involuntarily seize the arms of the seats to avoid being precipitated below.

Bair's Gold Separator.

Albert M. Bair of Littleton, Colo., has invented an appliance for the separation of fine gold dust from the earth and dross that contain it, consisting of a series of semi-cylindrical or U-shaped sections, joined one within another, the terminal section being the largest and is thickly perforated. Beneath this terminal section is a double-inclined table, covered with a section of Brussels carpet to lodge the gold dust, which is sprayed through with the water. The inner portions of the sections are provided with numerous longitudinal rods. As the water and gold-bearing material passes along, the latter will be screened by the longitudinally extending rods, by the passage of such fine material between them as the spaces will admit. It is claimed that the round shape of the flume materially adds in the collection of gold at its bottom. Such particles of gold as pass through the perforated shells of the sections it is expected will be deposited in the pile of the carpet, or in such other riffle as may be employed, which will be provided with mercury for amalgamation. Owing to the spring supports for the sections, the vibration of the latter, due to the jarring effect of the passing material, will help the separating process. This vibration is wholly automatic. The pile fabric (Brussels carpet) is placed two inches from the perforated shell, so that the water will spray through the shell

onto the carpet, and heat the deposited gold into it. The two outer lower edges of the platform are turned up, to prevent the material from passing off.

Gold-Bearing Rivers.

A new dredge is now in use on the Fraser river, in British Columbia, with plenty of capital behind it. W. A. Shahan, the inventor, recently described it to a Tacoma *Union* reporter.

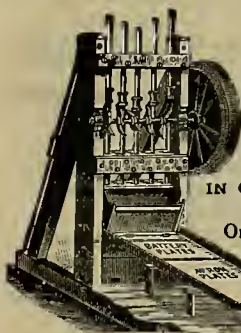
"The beds of all gold-bearing rivers are covered with a pavement of boulders," said the gentleman. "Through these boulders the gold percolates, they acting the same as riffles in a sluiceway. In fact, the rivers of all placer countries are nothing more than nature's sluice boxes. The gold settles in a stratum of sand lying on the river bedrock and beneath the boulders. By means of a suction pipe so arranged as to telescope and accommodate itself to the depth the bottom of the river is reached. With the immense power given by the vacuum chambers and centrifugal pumps the gravel is drawn through the suction, emptying into sluice boxes fitted with amalgam plates. The boulders are taken care of by two wrought iron baskets so arranged as to work automatically.

"When one basket is filled with debris or large stones it is tripped and emptied, the stream being turned into the other basket. The present suction pipe is eight inches in diameter and has a lifting pressure of 750 pounds at the nozzle. Over the top of the pipe is placed a glass cap. Connecting the air pump the water is forced from the pipe, a submarine electric light dropped, and through the glass the entire bottom of the river is brought into view so closely that in one spot on the Fraser we were able to make out the glitter of gold in the sand.

"The dredge is 75 feet long by 24 feet wide and has cost in the neighborhood of \$10,000. What is needed is that the suction pipe be made two feet in diameter instead of eight inches, with a corresponding increase of power, and then we will be able to handle the largest pieces of slide rock found in the Fraser river bottom."

A surprising amount of activity is being displayed in all of the gold camps of the State, says the *Butte Inter-Mountain*, and Montana promises to lead all other States in the production of the yellow metal during the present year. Never before has the search for gold been prosecuted with such eagerness, and in every canyon and on every hilltop where gold is supposed to exist there are scores of hardy prospectors even at this season of the year. Placer ground thrown aside years ago because it did not pay then, or abandoned to Chinese, is now being worked by miners, and the results are very satisfactory.

MINING, IRON AND WOODWORKING
MACHINERY AND SUPPLIES
 INGERSOLL-SERGEANT PISTON INLET AIR COMPRESSORS AND ROCK DRILLS
ENGINES AND BOILERS
PARKE & LACY COMPANY
 21 AND 23 FREMONT STREET, SAN FRANCISCO, CAL.



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Scientific Progress.

Growth of Invention.

It is said of Henry Renwick, the great patent expert, who was the first examiner appointed in the Patent Office at Washington, and who resigned in 1874, that he did so because he had made up his mind that comparatively few more patents would be issued; that the whole field of invention had been pretty thoroughly explored and exhausted, and that he, therefore, thought he ought to look out for some business of a more permanent kind. In commenting on this, a writer in *Cassier's Magazine* says that, at the present day, with the multitude of inventions that have cropped up, and with the host that are to follow, this early view of the subject is uniquely interesting. Experience has more than borne out the statement once uttered that one invention makes at least one additional one necessary. If an article be invented, a machine for making it must often be invented also; the building of this machine may again necessitate the employment of some special tool, for which, too, we may have to depend on inventive genius, and in this way multiplication of devices may go on to an extent little imagined in the beginning. The discovery and manufacture of kerosene for illuminating purposes, for example, are said to have been alone responsible for about 5000 different inventions which have been patented. There are similarly said to be about 3000 separate inventions for coupling railroad cars, and something like 800 for knitting machines. Other equally striking cases would no doubt be afforded by a study of the subject, but are scarcely necessary to complete the picture.

Development of Engineering Science.

Speaking of the development of engineering science in connection with the Brooklyn bridge and the projected bridge across the Hudson river at New York, Representative Geary says:

"A man learns a good many interesting things in Congress. For instance, I am on the Commerce Committee, and we have had a good deal to do with this New York bridge bill. Until the suspension bridge was built across the East river between New York and Brooklyn, it was not supposed that a steel wire could be made of sufficient tensile strength to hold together for a distance of 1600 feet. Until then, with the wire that had previously been made, a wire of that length would part of its own weight. Mr. Roebling, the engineer of the bridge, who was laughed at by other engineers for asserting that a wire of 1600 feet could be made which would hold together, experimented until he proved that his assertion was a fact. Since then the Firth of Forth bridge has been built with wires 1700 feet long, and the making of steel cables has now reached such a degree of perfection that a wire can be made of 2100 feet and strung from one point to another without breaking. In the New York bridge bill we proposed that 2100 feet should be the lowest limit, and now we want to appoint a commission of five engineers, of whom Gen. Casey shall be one, to see if a wire of still greater length cannot be successfully made."

An Interesting Discovery.

Accident recently revealed to the managers of the Baltimore Copper Works a fact which may have some value in refining the metal there handled, says the *New York Tribune*. At this establishment the reverberating furnaces are connected with a great chimney by means of long underground passages, called "culverts," in which more or less oxidized copper, as well as sulphides, arsenides, and other compounds, is carried off in the form of dust and smoke. These are deposited in the culverts, and are subsequently collected to be worked over again.

Amid an accumulation of such stuff, a few days ago, there were found iridescent, moss-like masses, which upon examination proved to be pure copper. How the transformation was effected was a mystery, until it was discovered that petroleum, which saturated the soil in the vicinity (having escaped from a neighboring refinery), had entered the culverts through a crevice. Under the influence of high heat it was volatilized, and the resulting gases had "reduced" the oxides and sulphides into pure metal. It is probable that this revelation will be turned to advantage in future operations.

Weight of a Crowd.

In a paper by Professor Kernot, read before the Victorian Institute, he compared the various estimates as to the weight per square foot of a crowd. One estimate, quoted as French practice by Stoney and Trautwine, gives 41 pounds per square foot of a crowd. Hatfield, in "Transverse Strains," gives 70 pounds; Mr. Page, engineer to Chelsea bridge, 84 pounds; Mr. Nash, architect to Buckingham Palace, quoted by Tredgold, 120 pounds; W. N. Kernot, at Working Men's College, Melbourne, gives the weight at 126 pounds; Prof. W. C. Kernot, at Melbourne University, puts it at 143 1/2 pounds, and Stoney, in his work on "Stresses," as 147.4 pounds per square foot. The space occupied by soldiers, as taken by Hatfield in his estimate, is not the same as a crowd. Soldiers are arranged in lines at a distance apart to allow room for knapsacks and other accouterments; but a crowd is forced together into close contact, an average man in a crowd occupying a space of little if any more than one square foot. On the whole, Prof. Kernot inclines to favor Mr. Stoney's estimate of little more than one man per square foot, and gives it as approved that a dense crowd of well-grown men weighs between 140 and 150 pounds to the square foot.

How Fast the Earth Turns.

Everybody knows that the earth makes one complete revolution on its axis once every 24 hours. But few, however, have any idea of the high rate of speed necessary to accomplish that feat. The highest velocity ever attained by a cannon ball has been estimated at 1626 feet per second, which is equal to a mile in 3.2 seconds. The earth, in making one revolution in 24 hours, must turn with a velocity nearly equal to that of a cannon ball. In short, the rate of speed at the equator has been estimated at nearly 1500 feet per second, or a mile every 3 1/2 seconds, or 17 miles a minute.

MORE than one-half the world's supply of tin is now mined in the Strait's Settlement, says the United States Consul at Singapore. The output in 1891 was 36,061 tons out of a total of 57,551 tons. Of the balance 12,106 tons were mined in the Netherlands, India, leaving but 8384 tons for the rest of the world. For a century up to 1889 the Maylays worked tin by a most primitive method, washing the nodules from the clay and smelting them when dry between layers of charcoal in a clay furnace, fed by bamboo bellows. The molten metal trickled into a vessel, from which it was ladled into molds.

THE water works supplying cities and towns of the United States are reported to represent an investment of \$430,000,000, nearly one-tenth as much as in railroads. The miles of water-mains in New England are nearly equal to the miles of railways. There are only 68 water works in eight Southern States, while the total number of cities and towns in the whole country supplied with water works is about 1700. Probably two-thirds of the supply is furnished by the municipalities, and the balance relies on corporate enterprise.

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By J. S. PHILLIPS, M. E.

The work is divided into four parts—Rocks, Veins, Testing and Assaying. The geological chapters are intended to give miners a practical idea of the various formations. The chapters on mineral veins are derived from long observation, and the section on exploration has been carefully considered. All that relates to discrimination and assay of minerals has been kept as free from formulae as possible. The work is written for practical men, and all the explanations and descriptions are clear and to the point. It is so prepared that it is useful to uneducated men as well as scientists.

Mechanical Progress.

The New Atlantis.

The latest idea will soon be put into tangible shape—the building of a summer hotel in the Atlantic ocean.

The exact spot in the ocean where the buildings will be erected has been selected, the soundings made and the location marked by buoys. It is off the Long Island coast, probably somewhere between Fire Island and New York, fourteen miles from the shore. Atlantis will not be built upon a sandbar, nor built over shoal water.

The chief engineer is Captain R. D. Evans, U. S. N., head of the lighthouse board. With him is J. C. McGuire, who has charge of the steel construction in Government buildings. Captain Howard Patterson, formerly of the U. S. N., formerly professor of science in Brown's College, and who was admiral of the Haytian navy, is another of the engineers.

It is said they have agreed to put down the foundations under a forfeit of \$1,000,000. This convinced those who hesitated about putting money into the scheme. The structure will rest upon cylinders. Atlantis will include a number of structures, of which but one will be built this year. It will be a great pavilion, constructed in the form of a square, two stories high in the main and three in the towers, and will rest upon large iron cylinders, filled and sunk in Portland cement.

The main floor will be thirty feet above the water, and the Roman order of architecture will predominate.

The edifice will be built entirely of steel, iron, glass and tiles, thus making it entirely fireproof. Within will be a grand amphitheatre. It is calculated that the lower floor will accommodate 10,000 people, while the gallery will hold 7000 more. There is also provision for a spacious esplanade, or roof garden, seating 3000. There will be 120 large rooms for hotel accommodation, a cafe, restaurant, billiard room and all accessories of that sort. Then there is the anglers' pavilion, which ought to increase the popularity, because the structure will be located in the midst of the fishing grounds. The promoters of the enterprise say it offers all the advantages of a sea voyage without the discomforts of sea-sickness. It is promised that it will be within two hours' sail of New York. It is expected that the building will be opened before the summer is over.

Uniting Wrought and Cast Iron.

When one stands in a blacksmith's shop and sees him fasten together the red hot ends of a wagon tire, with a few skillful blows, it looks like a very easy matter. And so it is, in one sense; and it is rather easy to unite, in the same way, any other pieces of malleable iron. But cast iron has a different grain. It is crystalline and not fibrous, and hence it is impossible to weld it as easily and at the same degree of heat as wrought iron. In fact, many blacksmiths consider it impossible to do so at all. But Jasper Roberson, of Tarkio, Mo., says that he has found a way to weld wrought and cast iron together, and has done so at least three times. In each case the joint was so sound that the articles thus repaired have been in service for over three months without further breakage. Mr. Roberson prefers to keep his method a secret, but he would sell the privilege of using it to others for a reasonable price. It is said, he says, only to objects light enough to be handled in a common blacksmith's forge. Mr. Roberson does not claim to be the only man who ever discovered how to perform this feat; but it is not every worker at the anvil who knows the trick.

A CHICAGO inventor, Paul R. De F. D'Humy, proposes to make armor plate for warships out of two-inch steel cut in strips

of the necessary width, and bolted together so as to present the edges to the enemy. It is argued that this plan puts it in the power of manufacturers having small plants to make the largest plates demanded. But it is not clear how a few bolts can hold the strips together tightly enough to resist a conical projectile so effectually as the cohesion of steel forged in one solid mass.

SCALES big enough to weigh a load of 150 tons have been supplied to Uncle Sam's great gun foundry at Watervliet, N. Y. They are mounted on a car, which can readily be shifted from place to place. The great Krupp gun exhibited at Chicago weighed 130 tons, and therefore would have been a moderate load for this apparatus. The tendency in ordnance nowadays being toward less enormous pieces than were in favor four or five years ago, it is doubtful if the Watervliet scales ever prove inadequate.

ALUMINUM SCABBARDS for bayonets would have been in Uncle Sam's service ere this, because of their lightness, had the Government been satisfied with any of the soldiers offered for the completion of these articles. Some foreign powers, however, it is said, promise a handsome reward for the discovery of a solder suitable for the purpose.

WILLIAM H. SLATER, of Norwich, Conn., will pay \$60,000 more for his elegant steel steam yacht, built at Bath, Me., than foreign builders would have charged; but he was satisfied that he would get enough better workmanship to make up for the difference in cost. Besides, Mr. Slater is a thorough American.

Infusorial Earth.

William Cann, Jr., agent for the Electro Silicon Company of New York, has let a contract to R. Noce for the extraction of 200 tons of infusorial earth from the Parker and Noe mine in the Chalk Hills northeast of Virginia, Nev. Numerous shipments have been made from the same locality during the past two years, but heretofore the earth was sent by rail to this city, thence shipped to New York via Cape Horn. This shipment will be sent directly overland, if freight rates can be secured low enough. The so-called Chalk Hills are really a vast deposit of silica or infusorial earth, which, for commercial purposes, is ground to powder and put up in two-ounce packages, and in that form is sold for 15 cents a package for polishlog purposes. It has recently been discovered that infusorial earth, when soaked with crude petroleum, is an excellent material for kindling fires, a small block of it less than three inches square, when ignited, blazing with a fierce flame for a period of fifteen minutes.

A Close Call.

Joaquin Miller, the poet, grows reminiscent and says: In the winter of 1894 I was employed to push a tub along a wooden track underground. It was a new tunnel; everything about it new and experimental. The mouth of the low, narrow tunnel opened out toward the sun and the swift, clear Klamath river. I was employed because I was so small. The two men worked on their knees and breasts. On the fifth day the hillside slid in and one of the men was crushed. The water came in. My head was caught up between two timbers, lifting my face above the water. I could hear the man groaning, till the water reached where he lay—then was the end. But as one of the men was out of the tunnel getting timbers and I happened to be near the mouth of the tunnel with my tub at the time of the slide, I was dug out by the man who escaped the same day. I set this down as one example in a thousand that almost any miner might narrate from his underground life in California.

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Electric Progress.

"Edison's Town."

It is pretty hard to keep pace with the work Thomas A. Edison is doing. At present everybody is talking about his latest invention, yet very little is known about a town in New Jersey that he owns and which is named after him, and where he is undertaking one of the biggest commercial operations of the age. All that has heretofore been written on the subject has been with reference to the machinery he invented, and with which, by means of magnets, he is reducing high grade iron from low grade ore. Something about the town and its work ought to be of public interest.

Edison is in the mountains, two miles and a half from Ogdensburg. Formerly it was known as Ogden, because the old Ogden mine was there. This mine used to be operated, but it didn't pay and was abandoned. A lot of rickety tenement houses was all that remained of the building. Since Edison took the property, four years ago, great changes have taken place. Electricity, introduced by Edison, is responsible for the wonderful improvement.

Within half a mile seventeen buildings have been constructed, one of them 500 feet long and 100 feet high. Twenty 1200 candle-power arc lights enable night and day shifts to work. A water tower 123 feet high gives sufficient head to make water flow wherever needed, and long-distance telephones enable the superintendent from his office to converse with one in any of the buildings or an agent in Chicago. All work is done on the premises and done systematically, every item of cost being considered and labor-saving devices used. In the carpenter shop, for example, which is 100 feet in length, heavy beams are mortised by circular saws which are operated by electricity and suspended from above, swinging like a pendulum, and the table upon which is the beam to be mortised is raised so that the saw will cut to the proper depth. Adjoining this shop is the stock house, which contains \$100,000 worth of hardware—everything, from a large bolt to a small paper of pins.

The mine is spanned by four mine troyes, each 216 feet in length. To the novice each is a high suspension bridge, the ends upon trucks which run upon car tracks and resting upon the ore in the mine, which is raised in an immense scoop and carried along this bridge and dumped into the car at the end. One lump that lay near the rollers contained 36 cubic feet. This ore is first dumped between rollers six feet in diameter, which drop it to rollers four feet in diameter, and so on from roller to roller until the ore is crushed into half-inch lumps; then it is taken to the dryer and thence to the stock house, 280 feet distant, by means of belts, elevators and buckets like those used in grist mills, except that they are of iron and greater capacity. The moisture remaining in the ore is but one-tenth of 1 per cent. The fine ore is carried upon rubber belts, the edges of which are raised by rollers keeping it in place, into a building 100 feet high, when it is allowed to fall through boxes in which are magnets, and the ore is separated from the dust, the ore coming out at one place and the dirt at another, and is carried either out to the tailing banks or dumped into the cars ready to receive it. The tailings being free from dust make the best of building sand, and is shipped to Jersey City and New York. It is sold for 50 cents a ton, costs $\frac{1}{4}$ cent to dump it directly into cars and 5 cents if taken after deposited on the tailing bank. The advantage of the Edison method is that the bricks of ore will fuse 15 feet higher than in the ordinary furnace, thereby saving largely in fuel. The iron is 68 per cent metallic, while the purest known is 72 to the ton, showing that the ore is of superior quality. The capacity under the old system

was 1000 tons; under the new it will be 5000 tons per day, and 300 men will be required to do the work of 1200 under the old system. The changes, which will be completed in about four weeks, were begun a year ago last September, when 25 per cent of the machinery then in use was thrown out. The improvements will cost \$250,000 and bring out a high grade, clean ore.

Electric Mileage of the United States.

In 1888 the entire electric railway mileage in the United States was only about 48, distributed over eight States. At the close of last year the electric railways comprised 61 per cent of the entire street railway system of the United States, this gain being at the expense of the horse and steam lines. The past year the mileage operated by horse power decreased from 4460 to 3497 miles, and that by steam 640 to 566. The total street railway mileage increased 540, but the electric mileage increased 1517 miles, showing up an extensive conversion of horse line into electric. About one-quarter of the mileage of the horse railways in the United States a year ago has been fitted for electricity. It is predicted this system will be a formidable competitor of the steam railways for suburban traffic.

THE Jex system of electric propulsion is described in an English electrical paper as a system in which the overhead wires run transversely across the street at intervals equal to about the length of a car; above the middle of the track the wires are cut and joined with an insulator, all the wires at one side being positive and those on the other negative; there are two contact devices on the car, one for each polarity, and they are of sufficient length to touch one wire before leaving the other; by this means no ground return is required. In another issue of the same paper a modification of this system is described in which an insulated conductor is surrounded by a conducting tube in insulated sections with means for connecting these sections with the conductor operated by a magnetic device carried by the car; neither of the methods has yet been used in practice.

WHAT will prove a most useful industrial development is the application of electricity to the cleansing and preservation of boilers. The method employed is the sending of currents periodically through the shell of the boiler. By this means, it is stated, the scale formed on the shell and tube is disintegrated and easily removed.

ELECTRICAL BICYCLES are the latest. The weight of the batteries when filled with liquid is to be forty-four pounds, and the whole weight of the machine is to be 155 pounds.

THERE is in New York one electric lighting company that supplies electricity to more incandescent lamps than there are in all London.

ELECTRIC LIGHTS will make it possible to navigate the entire 35½ miles of the new Manchester ship canal by night as well as by day.

THE city statistician of Chicago reports that there are 150 establishments for "electric lights, works and materials" in that city.

THE underground electrical conduits of New York City have a length of 1667 miles.

THE work of draining the valley of Mexico, which has been in progress of development for nearly three hundred years, will soon be completed. It has cost about ten millions of dollars and some 200,000 human lives. The canal and six-mile tunnel through the mountain range have a total length of nearly forty miles. Nine-tenths of the tunnel is finished and only some 15 per cent of the canal remains to be completed.

Practical Information.

Timepieces Measuring Centuries.

Some animated and interesting conflicts of opinion have occurred between geologists in trying to ascertain how long it took the Niagara river to cut out the "gorge," which extends for six miles below the falls. One of the most modest estimates puts the time required at 6000 or 7000 years; others greatly exceed this. Such a calculation is important, chiefly for the light thus thrown on the interval which has elapsed since the glacial period; for it is admitted that the work has all been done since the retirement from that vicinity of the great ice-sheet which once forced its way down to the Ohio valley from the Arctic regions. However widely the figures regarding Niagara may differ, there is also an apparent disagreement between this and another chronometer of the same kind up in Labrador. The Grand river canyon has a length of twenty-five miles, or about four times that of the Niagara gorge. It is narrower and deeper than the chasm spanned by the suspension bridge; and so is the stream. But the rock to be eroded in Labrador is gneiss, much harder than the limestone crust and the supporting shale at Niagara. Looked at superficially, therefore, it would seem as if ten or fifteen times as many centuries were required to excavate the one as the other. And as the glacial period terminated much sooner down in the latitude of Niagara than it did up in Grand river canyon, 500 or 600 miles farther north, one is puzzled to know how it was done. However, the problem is not the less fascinating for being so complex. The comparison is worth making.

A Note About Water.

Where does all the water in the sea come from? is a question that many a small boy has asked his father, and which many a father has found himself utterly unable to answer. Some idea of where it comes from may be gathered from a glance at the following table of the hourly quantity of water discharged into the sea annually by some of the best known rivers of the world:

River—	Million Feet per Hour.
Amazon.....	3,700
La Plata.....	3,100
Mississippi.....	2,070
Volga.....	1,120
Yukon.....	1,100
Columbia.....	1,000
Danube.....	960
Ganges.....	700
Nile.....	560

This, of course, throws the question back a step. The question becomes, where does the water in the rivers come from? When that is answered by the statement that it comes from the hills, we have gone about as far as we can go. Water is an element, and what its original source may be, no man knows.

The Source of Aluminum.

It is true that every brick in a house and every bank of clay contains a considerable quantity of that beautiful metal, aluminum. In commenting on this subject, a scientific writer says that science has not yet discovered any commercial way of extracting the metal from clay, because in the form it there exists, namely, aluminum oxide, it is combined with silicon oxide, and these two substances behave like a pair of Siamese twins; they are so strongly bound together it is next to impossible to separate them. Therefore, in the production of aluminum, chemists do not use clay, but turn to some material which contains the oxide of alumina free from silica. The best material is a mineral known as cryolite, which comes chiefly from Greenland. It is a double fluoride of aluminum and sodium and an artificially prepared sesquioxide of alumina. These are suspended in a bath of molten chlorides of the alkaline earths, and then subjected to electrolysis by powerful dy-

namous. The sodium salts are decomposed, the metallic sodium seizes eagerly upon the oxygen that was in combination with the aluminum, and as a result the white metal aluminum is freed and settles to the bottom.

Spiders Eat Their Mothers.

One of the most unnatural things in nature, if the expression is allowable, says London *Nature*, is the manner in which the young of the common wolf spider, found everywhere in this country, treat their mother. After the little creature has laid her eggs, she envelops them in a silken covering, so as to make a ball about the size of a pea, and this she carries about with her wherever she goes, and will defend it with her life. When the young are hatched they climb on her back, giving her a monstrous appearance, and ride about until nearly half grown, and as soon as they discover their strength they fall to and devour their mother. As a rule, the maternal relation is recognized in the animal and insect world only as long as the necessity for protection exists; but instances of the young actually devouring a parent by main force and common consent are extremely rare.

THE longest ocean cable in the world is that of the Eastern Telegraph Company, whose system extends from England to India and measures 21,000 miles, says Kate Field's *Washington*. Africa is now completely encircled by submarine cables, which make up altogether a length of 17,000 miles. There are eleven cables across the North Atlantic, though not all of them are at present in use. Five companies control the lines of telegraphic communication between this country and Europe.

SENATOR COCKEREL'S bill to promote aerial navigation authorizes the appropriation of \$100,000 for payment to any inventor from any part of the world who shall, at any time prior to the first of January, 1900, construct a vessel that will demonstrate the safety of navigating the air at a speed of thirty miles an hour, and capable of carrying passengers and freight to the extent of five tons.

THE largest dammed body of water in the world will be secured by the building of a dam at Cloquet, Minn., on the St. Louis river, 900 feet long and 80 feet high, by which back water will be extended 60 miles.

Visit of Debris Commissioners.

On Sunday Col. Benyard and Major Heuer, members of the California Debris Commission, arrived in Quincy via La Porte, where they had been examining mines which had applied for license. They proceeded to Spanish Ranch, observed the operation of the Gopher Hill mine, went down to Indian Hill to examine the Eyraud mine and returned to Quincy Monday evening. On Tuesday they went eastward, stopping at Trayner's and Tefft's, and examining the restraining works on Little Long Valley creek and on Coggs well ravine, then proceeded to Johnsonville. An inspection of the dam on Squirrel creek developed the fact that it was full of tailings, and the mines on that stream were stopped by the Commissioners. Work will not be resumed on Squirrel Creek until a satisfactory dam is built to hold the debris coming down that stream. After examining Vanzini's mine in Yankee ravine, near Jamison City, the Commissioners left on the Reno stage for San Francisco on Wednesday morning, well pleased with their trip through Plumas.

From these gentlemen we learned that numerous mines had applied for license and were operating under the Caminetti bill. The Commissioners expect a largely increased output of gold in the State as a result of this revival of mining by the hydraulic process.—Plumas National Bulletin, June 23d.

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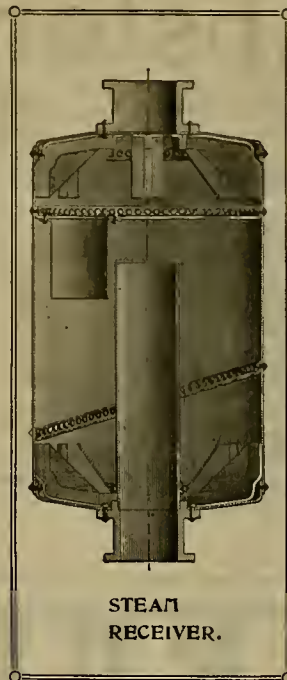
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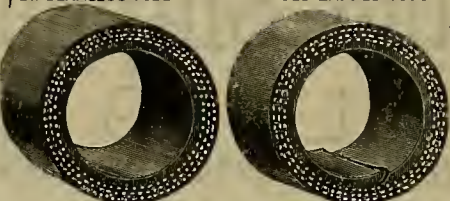
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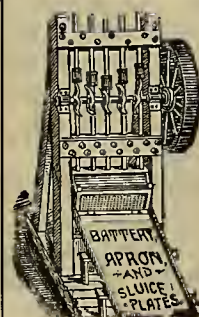
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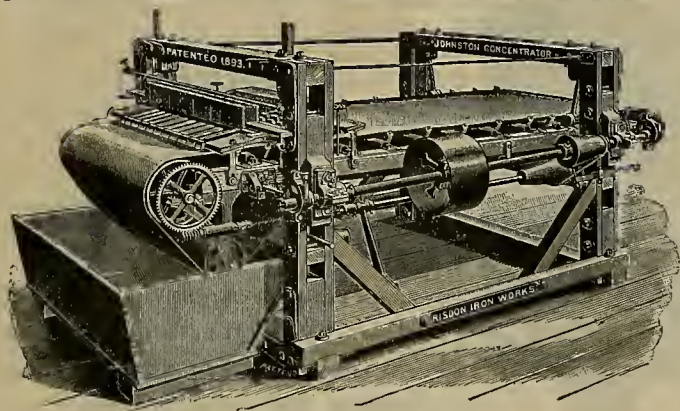
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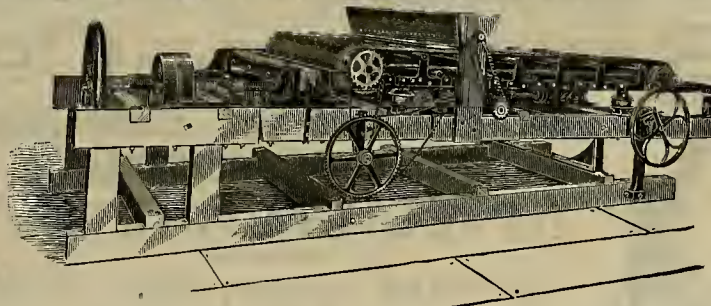
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Extracting Gold and Silver by the Wet Processes.

The following is from the Sydney Telegraph of May 11, 1894:

At the monthly meeting of the Engineering Association of New South Wales, held at the rooms, 70 Pitt street, last evening, Dr. John Storer read a paper on "Some Improvements in Treating Minerals for the Wet Extraction of Gold and Silver."

Dr. Storer pointed out that little had been done in Australia in connection with the wet extraction of gold and silver. An exception was the Mount Morgan gold mine, where chlorination was extensively used to dissolve the gold from the ore. This was due to a variety of causes, one of the main reasons being the long time that had hitherto been required to complete the circle of operations, a time sufficiently long to necessitate the employment of much plant, besides other inconveniences. These methods departed entirely from the use of quicksilver amalgamation, and were based upon the action of one or more of chemical reagents dissolving the metals. The watery solution thus obtained was filtered off from the ore originally containing these metals. When that point was successfully attained the ultimate recovery of the gold or silver was a very easy task. Chief among the difficulties was the slow speed at which filtration of the solutions from the ore took place after the gold and silver had been got into solution. This drawback was common to all methods. In some instances this difficulty of filtration was so pronounced as to entirely prevent profitable work being done. And, in short, the mechanical part of the work stood most in need of improvement, and not the chemistry of the operations. Various endeavors had been made to hasten the process of filtration by artificial pressure. Filter presses had been used, hydraulic pumps employed, compressed air had been taken, and suction applied to the bottom of the filter beds tried, but only with qualified benefit. In all these endeavors, from the corrosive nature of the chemicals employed, the forms of apparatus having movable parts had had too short lives to be a continual working success, and practically filtration under natural atmospheric pressure had been compulsorily reverted to with all its great drawbacks of slowness and uncertainty. The speaker had, in conjunction with Mr. T. B. Lacy, of the Parke & Lacy

Company, devised what was considered an important simplification of the mechanical process of pressure filtration. The apparatus was simple in the extreme. It had no movable working parts, required neither engine nor pumping gear, and working in quantity acquired a speed of filtration greatly surpassing anything hitherto employed. A working size plant had been built, and was then in successful operation in Sydney. It treated for filtering two-ton ore charges at a time. The guiding idea in the apparatus was the direct use of steam, as the source of the pressure or power. By means of specially designed parts the steam direct from the boiler was admitted upon the body of the solution required to be filtered without breaking the surface of the latter. As a consequence of the quick and uniform action of the steam upon the surface of the solution, or water when that was used for washing purposes, only the expenditure of steam on the surface was required to produce the pressure. The machine was divided into two main portions—the pressure tank and the filtering or leaching vat. Dr. Storer then proceeded to give an elaborate and interesting technical description of the machine. The steam when admitted pressed evenly upon the liquid without breaking the surface, and forced it through a connecting pipe into the filtering vat. This vat had a total length of six feet six inches, with a diameter of four feet, and the charge, after being exhausted, could be emptied out at once for a fresh charge, both of which operations were done in less than half an hour. In detailing some interesting and satisfactory results which had been achieved with the machine, Dr. Storer said that experience had shown that different types of ore could be filtered at different rates of speed. The average quantity of solution required to the ton of ore, when using chlorine or cyanide of potassium as a solvent, was 120 gallons, and for the washing, a quantity of water equal to about 50 gallons. There was thus a total of 170 gallons to force through every ton of ore. In a special trial with quartz tailings, 600 gallons were forced through in 50 minutes; while under atmospheric pressure the speed of filtration was 15 gallons in the same time. That was equal to a speed of 40 times quicker filtration by means of the pressure system under notice; or, in other words, with a working filtering plant of equal size, they could filter in a week what would take a working year to do by the prevailing method. With regard

to the cost of the method, the expenditure of steam was equal to about half a horse power engine. The speaker concluded by drawing attention to the importance of the subject, and reading some extracts from American papers which went into the matter.

A vote of thanks was carried to Dr. Storer, who invited the members of the association to inspect the machine at Parke & Lacy's establishment at Pyrmoot. The invitation was accepted for Saturday week.

An Evident Coincidence.

TO THE EDITOR:—In your issue of the 9th Messrs. Almarin B. Paul and G. F. Deetken express perplexity as to the meaning of my statement that in a well-managed Gilpin county (Colorado) mill as much retort gold is obtained by amalgamation as is indicated by the previous fire-assay of the ore, and that the mill bullion being 760 to 780 fine the extraction is close to 76 or 78 per cent.

The explanation, which I ought perhaps to have made more obvious, is as follows: The average extraction at the mill is 76 to 78 per cent. The retort gold is worth about \$16 per oz., equivalent to a fineness of 750 to 780 per thousand. It is a coincidence (and nothing more) that the figure representing the average extraction should be nearly the same as that representing the fineness of the mill gold. Thus, if 20 tons are found on sampling and fire assay to contain 1/2 oz. per ton, or 10 ozs. altogether, the mill will yield 10 ozs. of retort gold. The ore contains 10 ozs. of fine gold, worth \$20.67 per oz., and the mill extracts 10 ozs. of bullion, worth \$16.10 per oz. Out of a value of \$206.70 there is extracted \$161, equal to a yield of nearly 78 per cent. The mill gold is 780 fine. The coincidence is evident.

I regret that it was not, owing to the absence on my part of fuller explanation, so obvious to Mr. Paul, whose references to his age and experience were uncalled for and unnecessary. No one is too old or too young to learn. I yield to none in my respect for the pioneers of the milling practice of the Great West, but in no field of inquiry has the young man so much to learn and the old one so much to unlearn. Yours faithfully,

Deper, Col., June 23, '94.

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(Pioneer Mining Geologist's Office of the
Pacific Northwest.)

**Mining Law, Mine Examinations,
Metallurgy.**

ASSAYING AND ANALYSIS.

"Consulting Associate Mining Attorney at Law."

Will examine and report upon "Title and Exact Value"
of GOLD, SILVER, LEAD, COPPER, COAL, IRON, CLAY or
other MINERAL PROPERTIES in any part of the
world. Any information mining men may desire to
know, relative to the mineral or coal resources of the
entire Pacific Northwest, will be honestly given.

RD. WILLIS E. EVERETTE, 1818 E. ST.,
Tacoma, State of Washington, U. S. A.

Assessment Notices.

OCCIDENTAL CON. MINING COMPANY—LOCA-
tion of principal place of business, San Francisco
California; location of works, Silver Star Mining District,
Storey County, Nevada.

Notice is hereby given that at a meeting of the Board
of Trustees, held on the thirty-first day of May, 1894,
an assessment (No. 18) of Ten Cents per share was
levied upon the capital stock of the corporation, payable
immediately in United States gold coin to the Secretary,
at the office of the Company, Room 69, Nevada Block,
No. 309 Montgomery Street, San Francisco, California.

Any stock upon which this assessment shall remain
unpaid on the fifth day of July, 1894, will be delinquent,
and advertised for sale at public auction; and unless
payment is made before, will be sold on TUESDAY, the
thirty-first day of July, 1894, to pay for the delinquent
assessment, together with the costs of advertising and ex-
penses of sale. By order of the Board of Trustees.

ALFRED K. DUBROW, Secretary.
Office—Room 69, Nevada Block, No. 309 Montgomery
Street, San Francisco, California.

Practical Hydraulics.

A Book for Civil Engineers, Miners, Mill-
men, Hydraulicians, Mining Engi-
neers, and Irrigators.

By P. M. RANDALL.

This new work is by one of the most experienced hy-
draulicians of the country. It abounds with useful
tables for ready reference, in which the results of ab-
struse calculations are all placed in a form so that one
can find what he wants in a moment. For the engineer
the principles, formulae, coefficients, etc., are given; and
for those not familiar with higher mathematics, ex-
ample, rules, and tables are prepared. Thus the needs
of the scientist and the practical miner or millman are
each met. It is the most complete work on the subject
yet published, and is especially applicable to the Pacific
Coast.

Table of Contents.

The following brief abstract of the contents will give
an idea of the branches of the subject treated:

General Plan; Discussion of the Principles of Hydraulics;
Rules Deduced from Formulas Obtained; Examples
and Calculations; Extensive Tables for Ready Refer-
ence; Fundamental Laws of Hydraulics Demonstrated
and Expressed in Formulas and Rules; Flow of Water
through Openings; Weir Coefficients; Triangular
Weirs; Flow of Water Over Quadrant Weir (tabulated);
Application of Tables; Submerged Orifices; Flow
Through Orifices in Thin Partitions; Tables and Appli-
cations; Miners' Inches; Tables and Calculations; Flow
of Water Through Short Tubes and Compound Tubes;
Flow of Water Through Pipes; Tables of Velocities and
Cubic Feet Flows for Given Fall per Mile and Diameter
of Pipe; Coefficient for Bend-Circular and Angular;
Flow Through Nozzles; Inverted Siphons; Flow of
Water in Open Channels; Extensive Tables; Rough and
Ready Notes; Hints for Speedy and Approximate Esti-
mates, etc.

Price, \$2.00, post-paid. Sold by DEWEY PUBLISHING
CO., Publishers, 220 Market St., San Francisco, Cal.

MINING AND SCIENTIFIC PRESS.

The Leading Mining Journal in America,
Established 1850. Latest Discoveries in
Science and Improvements in Mining and
Mechanical Arts Illustrated or described. A Standard
Illustrated Weekly published at \$3 a year by DEWEY
PUBLISHING CO., 220 Market St., San Francisco, Cal.

Mining Summary.

The following is mostly condensed from journals published in the interior, in proximity to the mines mentioned.

CALIFORNIA.

Amador.

THE BAY STATE MINE.—*Ledger:* The Bay State mine is one of the old properties of the State upon which a hoist was erected and a shaft sunk about 40 years ago. Three years ago the people of Plymouth, who have always hoped for great things from a proper, thorough and systematic prospect of the lode which was through their town end to the Cosumnes river, organized the Bay State Mining and Development Company, and have put a great many thousands of dollars into the proposition of deep mining in the country between Plymouth and the river. During the progress of the work the company has encountered several setbacks, the chief among them being the water encountered in the drift at the 300-foot level, which has thrown them back at least twelve months in their work. At 80 feet the ledge was cross-cut and the rock sampled, a test being made which showed the amount of gold contained therein to be \$1.62 per ton. That it is true was not very encouraging to the stockholders, but work was pushed on down and at the 300-foot level they found a "horse" had come in the formation, so they had to drift some distance north and south to again strike the ledge. The ledge here widened out and a milling test was made upon a number of tons with the result that \$7.78 per ton was obtained. The increase from \$1.62 to \$7.78 per ton in 220 feet of depth was so encouraging that the drifts at the 300, where the bothersome water was encountered, was bulkheaded and the work of sinking continued without crosscuts until the 500 level was reached. When the shaft was down to the 500 level, crosscutting to the ledge was pushed forward at the 400 and 500 stations with the result that the ledge was encountered this week but a few feet from where Mr. Jones calculated to find it.

El Dorado.

Republican: E. Bind of this city is superintending some work in deep gravel at Pleasant valley in the interests of the San Francisco Bridge Company. A shaft is being sunk through the lava. Work was commenced in an old shaft about 50 feet deep, which has been excavated to the depth of 126 feet through the lava without finding bedrock yet. It is believed that this deep ground is the continuation of the gravel channel partially opened through a shaft many years ago by Fleming & Sons. On John Fink's place, paying gravel has been discovered and the channel is supposed to be a tributary of the deeper ground that is being prospected by Bind. Snow Bros. have been working in some very rich gravel on the Newtown side of the lava ridge and this also lends encouragement to the idea that the deep channel will contain paying deposits.

The five-stamp mill recently started at the Gignac mine at Texas Hill near Placerville was cleaned up a few days ago after a run of 300 carloads. The owners report the result as highly satisfactory and say they intend to increase the mill to ten stamps as soon as possible. They have been breasting about four feet of gravel on the bedrock tapped by means of a tunnel.

Inyo.

THE NEW DIGGINGS.—*Independent:* Early in the week we made a visit to the newly-discovered placer diggings in Mzourka canyon. The scene of the discovery is in the region of the "Hickey Hood" spring, about six miles from Citrus. There are quite a number of Mexicans there who were engaged in cutting and packing wood. While looking for a spring that would be nearer his camp a Mexican named Gomez found gold in the canyon next north of the Hood Spring canyon. He had led comrades to prospecting, and they have found gold the entire length of the canyon, a distance of over a mile. The discovery caused many others to visit the locality, about 50 men being camped at the spring last Saturday night. "Colors" have been found in several of the adjacent canyons, but not in sufficient quantities to pay. The "Mexican gulch," as it is called, is the only place where gold has been found in paying quantities. On Saturday we saw about 350 pounds of dirt taken from this gulch and panned, and it yielded over three dollars. The dirt was not selected, but taken from the bottom of the gulch and about a foot from the surface. The formation of the range of hills through which the canyon runs is argillite, and the pay dirt is light gray in color and is formed from the elate by corrosion. Underneath the argillite is limestone, and underlying all is granite, which forms the summit of the main range. There has been a great deal of prospecting for quartz in the locality for over 30 years, but no paying ledge has ever been found. As the placer gold is not found in gravel, but in the crumbled elate, the supposition is reasonable that it was deposited where it now lies during some mighty eruption in past ages. The country is highly volcanic, and this seems the most reasonable conjecture as to the source from which the gold came. There are about 15 Mexicans at work and they are all making wages, although they are operating in the most primitive manner, packing the dirt to water and washing it in gold-pans. Bob Curasco has a good claim and he intends putting in a dry washer. By this means the ground can be worked much more rapidly. There is also plenty of water to run several rockers, and this system will probably be tried. Some further developments may be made in the near future.

Nevada.

Grass Valley Union: The mill at the German mine, Washington, has been started up. Superintendent Goss has everything in good shape

now and will work the mine to its fullest capacity. The sawmill at the Oak tree is running full blast getting out money for the new mill and other buildings at the mine. The Oak Tree is grading for a new mill about twice as large as the present one, and additional concentrators and other new machinery will be put in and the plant enlarged. Superintendent Garland of the Rainbow is also preparing to put up a mill. The mine has none at present. The Rainbow is turning out well and a mill is a necessity.

Placer.

AROUND DUTCH FLAT.—*Colfax Sentinel:* At the Alta mine, in which J. E. Doolittle and several other capitalists are interested, the tunnel is now in 1100 feet, and it will be several months before the channel will be tapped. The channel that the tunnel is being driven to tap is the white channel formerly worked through the Alta shaft. Already some good prospecting blue gravel has been struck that will pay wages, but the tunnel is being driven ahead to reach the white channel as soon as possible. The mine is being worked by the same parties who are improving Lake Alta.

At the Gold Shaft, the new shaft at Dutch Flat, the gravel continues to prospect well. Last week a waterwheel was put in to boost the gravel and pump the water from the mine.

At the Polar Star mine at Dutch Flat last week, a nice little prospect was picked up in the prospect tunnel that is being run. No extensive body of gravel has yet been discovered, although some of the richest drifting ground in early times was right adjoining where this mine is.

Some very good ground has been struck again in the Paragon mine at Bath, and the company has canceled the lease made a short time ago and is again working the mine.

San Diego.

Union: The old Cerro Muchacho is still pounding away night and day, not turning out quite as much gold as in the past, but still working away and doing well, paying nice monthly dividends. The Gold Rock forty-stamp mill gets away with 100 tons of ten-dollar rock per day without any trouble. The great vein on the Queen mine is now down over 300 feet, with pay ore more than 100 feet wide. At Picacho the great pumping plant at present stands idle. Efforts are being made by those who have the American control of the property, to put the rich mines to producing. J. M. Mendeive, agent for Dr. D. W. C. Jayne of New York, has sold the old Picacho group of gold-quartz mines, comprising the St. George, Gosben, Venus and Mars, with the fifteen-stamp mill, to Colonel D. K. Allen, representing a wealthy Chicago syndicate, who will start up the mill at once, adding fifteen more stamps now, to be followed by twenty stamps more as soon as they can be erected, making fifty stamps all told. Wood is abundant and cheap along the river, and the Colorado furnishes a never-failing supply of water.

NEVADA.

Ferguson District.

Helene Lode: The DeLamar Company has commenced work on a new tunnel about 300 feet south of the Jim Crow. This is to be used as the main tunnel for working their group of mines.

The DeLamar Gold Mining Company has en route from Milford one of the latest improved artesian boring machines. Four men, direct from the factory, are in charge of the machine, which is expected to arrive next week, when the work of determining the water question of the district will be begun. The machinery is guaranteed to be first class in every particular, and has a capacity of boring 3000 feet.

Three men have been working on Rig's Springs the past month and have succeeded in developing three inches of water. This proved satisfactory to the owners and they suspended further operations for the present. These springs are situated eight miles south of Ferguson district and the water could be piped to the DeLamar mines with the assistance of one pump at the springs.

J. R. DeLamar arrived by private conveyance last Monday, coming from Desert. He gave the mine a careful inspection and was well pleased with the improvements since his last visit. The Captain spent several days looking at springs and water sites, and stated that as soon as the water question was definitely settled a reduction works would be erected somewhere near the mines.

ARIZONA.

THE JAYNE CLAIMS SOLD.—*Yuma Times:* The Jayne claims at Picacho, consisting of the Gosben, Marsh, Venus and St. George, have been sold to Geo. M. Snider of Chicago, who has also purchased the mill at the river. The claims are all patented and are about four miles from the river. They have been extensively worked in past years, the rock running from \$3 to \$40 gold a ton. There are two shafts on the Venus 200 feet deep, connected by a tunnel 400 feet long. On the Marsh is a 450-foot tunnel. The Gosben has an incline 200 feet long, a tunnel 220 feet, shaft 220 feet, and a short tunnel 60 feet. The ore was formerly hauled by teams to the mill, but it is said the new owner will build a double track cable tramway. The mill is 15 stamps, and will be increased to 30 or 40 and new boilers put in. The price paid for the property is said to be \$125,000.

MINING NOTES FROM THE HASSAYAMPA.—*Helms & McLeish* are preparing to work the tailings at the old Wickenburg mill by the cyanide process. Mr. Hunt is chemist. The ore from which these are the tailings was hauled from Vulture and worked at this mill years ago, in the palmy days of this old town. There is a big pile of tailings and they are supposed to be rich enough to give big returns. A number of men are at work.

There are about 100 men at work at the San

Domingo placers. There are two stores, a saloon, milkman, etc. Considerable gold is taken out of these placers by the dry washer process, and it is said to be a fine quality. These miners at San Domingo are mostly "children of manyana."

BRITISH COLUMBIA.

WEEK IN CARIBOO.—*Kamloops Sentinel:* A. Wells, who has been on a trip through Southern Cariboo, returning to Kamloops last week, reports work being carried on vigorously on the Horsey and Cariboo companies' properties. A fortnight ago 175 men had gone into the Horsey mine, but some had come out the previous week, leaving the number working about the same as before. The excavation of the ditch is being done by sub-contracts. Water has been high, but not so bad as to interfere with work to any great extent. On the Cariboo property about 200 men are working. Water will be brought from the south fork of the Quesnelle to what is known as the China claim, a distance of about a mile, and it is expected that hydraulicicking will begin within two months.

SAVONA CINNABAR MINE.—*Col. Christopher* has completed development work on the cinnabar claim near Savona, and is now awaiting the arrival of an expert who will direct the building of the retorts for purifying. This plant is of comparatively low cost and will be erected at the mine. Wood will be the fuel and that can be obtained very conveniently. Col. Christopher is well satisfied with the prospect of the mine, which promises to yield highly profitable returns. Cinnabar running 2 per cent in mercury has been worked profitably, but the claim at Savona in the true vein runs from 50 to 60 per cent, so that it appears that the owners are fully justified in placing a high value on their property. In fact, Col. Christopher considers the ore the richest he has ever seen. The property is not for sale, so that there would be no object in booming the mine. Prospecting has shown that there is no danger of the vein pinching out, and it may safely be predicted that this claim will be one mining property which will add to British Columbia's fame as a mining country.

ENCOURAGING RESULTS.—*The Kootenay Hydraulic Mining Company* at Fort Sheppard recently completed a most important cleaning-up. Their operations have been directed to ascertain precisely the value of their property on the north bank of the Pend d'Oreille river. To this end they collected all the water from the Seven Mile and Nine Mile creeks and directed it into their main ditch with a head of 250 feet above the monitors at the level of the Pend d'Oreille river. They sent through their sluices 2200 yards of gravel, and the weight of the quicksilver amalgam shows a yield of \$525 in gold, equal to nearly 24 cents per cubic yard, some of the nuggets being of a good size, the largest being worth \$5.85.

COLORADO.

NEAR SAN JUAN.—*Silverton Miner:* The Occidental and two other claims, Cement creek, owned by Robert Hook, have been opened up to the extent of about 400 feet of work. The Occidental is in a large body of low grade ore, containing more gold than silver. The vein is fully 30 feet wide. A Philadelphia and New York company will erect a stamp mill on the property, the first \$500 payment having been made. The larger proportion of the ore carries 12 per cent copper and is well adapted to the new process.

The M. D. mine, Eureka gulch, C. E. Felver manager, is developed to the extent of about 200 feet of tunneling. The vein is 25 feet wide and is considered the mother vein of the Sonny-side country. Several mill runs have been made on M. D. ore from different strata of the vein. From the lead stratum 60 per cent lead, 1 ounce gold and 13 ounces of silver were obtained, and from the honey-combed quartz stratum, which is not much thicker than the average Silverton hotel bed blanket, a mill run was had of a trifle over 50 ounces gold.

THE COCHITI DISTRICT.—*Warner A. Root*, of the Denver Mining Record, says the Cochiti district, which extends several miles in length by three to four in width, is about 40 miles in a westerly direction from Santa Fe, and reached by a good wagon road all the way from that city. The nearest railroad point, however, is Welleco, on the Santa Fe, from which point stage lines run daily, a distance of about 24 miles.

"The principal mines so far developed, which is not saying much," says Mr. Root, "are the Washington, Lone Star, Iron King and Crown Point. The general character of the country rock is bird's-eye porphyry overlaid greatly with trachyte lava rock. The discovery point in most of the claims is where the outcroppings appear to be high blowouts or chimneys, and so far these are from 10 to 50 feet in width. The vein rock is more or less heavily mineralized quartz, with black sulphurets of silver, carrying gold, and the richer the ore is in silver the more gold is found."

"So far as I visited, there seems to be three distinct veins, varying in width, extending through the high ridges from Pino canyon southward through Colla, Peralto, La Jara and onward even into Bear canyon; and by development the ore is said to be nearer free milling from Colla canyon to the south. While Eagle or Bland City is growing rapidly, it is generally conceded that Allerton will be the principal camp or town of the district, lying as it does near the mouth of Pino canyon. From here wagon roads to Madia Dios and Cochiti anyone on the north, Colla, Peralto and La Jara canyons on the south, can be built. Forests of heavy pine and cedar timber abound on all sides."

"It is at Allerton, where General R. W. Woodbury and J. W. Bailey, a mill man of many years' experience in the Rocky moun-

taine, and who are the principal officers of the Cochiti Mining and Milling Company, are erecting an amalgamating mill of 30 tons capacity. The process of treating the ore will be by cylinder roasters, running through crushers and Cornish rollers and over amalgamated plates. Mr. Bailey is of the opinion that this process will save 90 per cent of the gold and silver in the ore. The product, run into bars, will then be shipped to the Denver mint. The Iron King mine, situated near the Lone Star and Crown Point mines, about eight miles away above Eagle or Bland City, and owned by this company, is by good judges considered the richest gold and silver bearing ledge in the district, and from the present outlook 50 to 60 tons can easily be shipped daily for years to come, although it may require some development to prove this. Should the mill prove a success in the treatment of the ores of the district, then others will be erected and the output of bullion product be most wonderful."

"It is expected sufficient water can be taken from springs in Pino canyon, some three miles above Allerton, but should such be not the case, it will be brought across the divide between Cochiti and Pinone, probably a distance of five miles, and with a fall of 50 feet in the last mile or so."

"A great many Colorado miners and prospectors are in the district, and representatives of much Colorado capital are making thorough investigations as to what is there and the future possibilities of the district."

LIKE A FAIRY STORY.—*There arrived in Denver last Wednesday over the Denver & Rio Grande from Aspen a car of nearly pure silver ore from the Smuggler mine, and the single car of ore is worth just \$400,000.* The car was under guard at Aspen all night, and when it goes through it will have just a few guns on the inside.

According to the newspaper story, the car contains the purest lot of silver ore ever shipped out of a mining camp, which lies about the car in pieces weighing from an ounce to 1800 pounds. This pocket of ore was struck in the Smuggler mine about six weeks ago, and has been kept under guard ever since. Its great value may be realized when it is remembered that at the present prices of silver it will bring \$400,000.

SMELTING PROCESSES IN THE SAN JUAN.—*Durango Southwest:* Four years ago but one smelter was in operation in the San Juan mining district. The ores to supply it and keep it running steadily came from Silverton, Red Mountain and Rico. The entire product melted was less than 20,000 tons. To-day we have in operation the San Juan smelter and the Standard smelter at Durango, the Grand View at Rico, the Loder at Ouray, the Crooke smelter now in operation and the Walsh smelter ready to blow in at Silverton, and a small plant at Lake City, seven in number; and still there are those who see no improvement in mining or smelting in the San Juan country. As against a smelting capacity of 100 tons a day four years ago, we have now a capacity of over 400 tons; and while we are importing ores from other districts to keep the smelters going, an equal amount of ore not mined in the San Juan is going to outside points. Some curious phases present themselves in connection with ore shipment and smelting just now. Ores from Ouray, Telluride, Rico and Ophir reach Durango. Ore from Red Mountain passes the Silverton and Durango smelters to go to Rico. Ores from Leadville and Eagle river pass the Leadville smelter and reach Durango. Ore from Silverton and Red Mountain and Rico pass through Durango and go to Pueblo. The mine-owners certainly have a choice of markets and the smelters are all on the qui vive for the product of the different mines. It is safe to say, with silver at 65 and 70 cents, a larger smelting product from the mines of the San Juan district will be taken out of the San Juan mines during the next six months than was ever before known.

MONTANA.

GENERAL NOTES.—*Inter-Mountain:* The week at the mines has been uneventful. The Boston & Montana is working as usual, except that operations have been curtailed at the Alex Scott. The ore shipments to Great Falls continue regularly. The Anaconda has been hampered during the week by washouts at the works near Carroll, and this has cut off the supply of ore cars. In consequence the mine has been running lightly during the week, but all is smooth sailing again. The Butte & Boston, Parrot, Colorado and Butte Reduction Companies have nothing new to report. The Lexington mill is again in operation.

At the Heinze works several important and extensive changes are in progress, in consequence of which the Glegarry mine is not producing ore. Mr. Heinze has decided to do away with ore hauling by teams, and when the present changes are made the ore and concentrates will all be handled by rail. Ore bins are being built at the Glegarry and the concentrator. The Montana Union track, at a point near the concentrator, will be elevated, so that it will be about 30 feet above ground at the concentrator. The ore from the Glegarry will be dumped at the concentrator and then moved by rail to the smelter; thence the matte will be shipped via the Montana Central. A saving of 50 per cent in ore-hauling charges will be effected by this change.

At the Clipper mine, Camp Creek, drifting is in progress.

At the Evelyn mine ore shipments are being regularly made.

Quite an excitement was caused during the week by a rich strike of ore in the La Monte mine, which lies west of the Evelyn. It is understood a shipment of ore went \$280 to

the ton in silver and about \$60 in gold. The La Monta is owned by Thomas Gorrie, and is being worked under lease.

Two new boilers are being placed in position at the smelter, and in the future the power to operate the concentrator will be conveyed from the smelter plant.

The Poorman mine is again in operation, turning out 60 tons of concentrates per day.

UTAH.

Beaver Co. Utahian: Messrs. Nelson and Lambert, who returned from the Gold Mountain mining district, report favorably. New machinery is being put up and the yards cleared for a long run at the Sevier. Eighteen men are at work there, and a great many more are in that district working placer claims. Some new machinery is being put in at the Annie Laurie mine, which is situated north of the Sevier.

Messrs. Nelson and Lambert have returned to prospect for placer claims. There are already eight or ten crowds of men, with from four to ten in a crowd, washing gold from the sands of the little creek. They claim to be making \$1 to \$8 per day.

WASHINGTON.

Tacoma Ledger: Placer mining on the Similkameen has been suspended for the present on account of the spring rise. There promises to be more gold taken out of the swift river this year than for 30 years past. Prospectors on the Columbia river are anticipating a big find in some of the banks and bars that are now being washed by the unusual high stage of water. And after the water recedes to the natural level many a placer miner expects to make a stake. The Columbia Placer Mining Company is engaged in the work of separating flour gold from the river sand near the mouth of the Yakima river. It has met with gratifying success, though it is now shut down for a time on account of high water in the Columbia.

Coast Industrial Notes.

—Three vessels now loading at this port will carry over 3,000,000 feet of redwood lumber to London.

—On the 1st inst. there remained 12,743,000 bushels of wheat in California, against 7,466,000 on June 1.

—A million and a half in bonds has been issued by the Oregon Railway and Navigation Company to repair the flood damage.

—The control of the Starr mills at Vallejo and Wheatport has been secured by the flour mill combine. Starr & Co. are to get \$2000 a month.

—The Parke & Lacy Company have sued eleven insurance companies for \$42,500 due them on a loss on their lumber mill, burned at Snoqualmie, Wash., last December.

—Articles of incorporation of the Seattle & Lake Washington Waterway Company, with a capital of \$3,000,000, have been filed by a company, which proposes to connect Elliott bay with Lake Washington by a canal.

—The survey of the Alaska boundary is being carried on by the Canadian surveyors principally by the new photographic method. Canada has appropriated \$250,000 for this survey and the United States \$60,000.

—The California Canneries Company has been incorporated with a capital stock of \$500,000, of which \$300,000 has been subscribed. The object of the company is to centralize and control the fruit-packing establishments of the coast.

—Fishermen at the mouth of the Columbia report that unless there is a good breeze they cannot do much, the high water having made such a swift current that they keep away from the regular fishing grounds out of fear of being carried to sea.

—Frank Cardin and J. T. Bibb, composing the Tacoma Grain Company, have bought of the receiver of the Northern Pacific Elevator Company the thirty-nine grain elevators belonging to the Northern Pacific system in the Northwest.

—The steamer Boscowitz, from the north, brings word of the loss of a party of seven Indians in attempting to run the high water now filling the Skeena river canyon. She also brought back Prof. King, Canadian boundary commissioner, who, having placed parties in the field, came down for the summer.

—A mammoth fir tree was recently felled at the camp of Captain R. E. Myers in Birch bay, near Whatcom, Wash. Three cuts from the tree scaled as follows: The butt log, 24 feet, scaled 8120; second cut, 24 feet, scaled 6800 feet; the third cut, 26 feet long, scaled 5232 feet, making a total of 20,222 feet in 74 feet of the tree.

—A contract for building the first forty-six miles of the Monterey & Fresno Railroad has been let for \$782,000. This will build the road to Hollister, whence it will go across the mountains into the San Joaquin valley. The contractor has agreed to build and complete the road by May 1, '95. The projectors of the road have floated \$3,000,000 of bonds in New York.

Market Reports.

The Markets.

SAN FRANCISCO, June 28, 1894.

At the current rate of the week the commercial value of the pure silver in a silver dollar is 48 1/2 cents. The quotations are very low; favorable comment and promised legislation do not aid its appreciation. The statement is made that "the central point around which the present system of gold-metallism revolves is the increase of exports from British India, which are paid for in cheap American silver, and the decrease of exports from the United States which have to be paid for in gold, causing a drain of that metal from Europe, where it is tolerably scarce. A silver dollar (U. S. currency) cannot be obtained in any part of Europe for less than 97 cents, nor will a gold dollar fetch more." If so, vast opportunities open before the enterprising European counterfeiter who, it is reported, are now coining bogus American dollars at a cost of fifty cents each.

New York Prices.

NEW YORK, June 28.—Following are the closing prices for the week:

	Silver in	Copper.	Lead.	Tin.
Thursday.....	28 1/2	62 1/2	9 00	3 20
Friday.....	28 1/2	63	9 00	3 20
Saturday.....	28 1/2	62 1/2	9 20	3 20
Monday.....	28 1/2	63	9 20	3 20
Tuesday.....	28 1/2	62 1/2	9 20	3 20
Wednesday.....	28 1/2	62 1/2	9 20	3 20

The local bullion, money and exchange quotations current are as follows:

Commercial Loans, per cent per annum.....	7@8
Commercial Loans, prime.....	6@8
Call Loans, gut-edged.....	7@8
Call Loans, mixed securities.....	7@8
Mortgages, prime, taxes paid by lender.....	7
New York Sight Draft.....	100
New York Telegraphic Transfer.....	12 1/2 c
London Bankers', 60 days.....	\$4.88 1/2
London Merchants.....	\$4.86 1/2
London Sight Bankers.....	\$4.86 1/2
Refined Silver, per ounce.....	62 1/2
Mexican Dollars, nominal.....	51@51 1/2

A London cable says: The improvement in stocks continues. The statement of President Cleveland has had a good effect here. Americans rose steadily to-day and closed at the best. It is believed that the worst of the trade depression in America is over, but only a slow recovery is expected. The other markets partly responded to the improvement in Americans, but business is still insignificant. The Indian Council sold 65 lakhs of rupees ranging up to 13 5/32. The amount to be offered next week will be reduced to 40 lakhs.

San Francisco Metal and Coal Market.

ANTIMONY.		QUICKSILVER.	
Refined, in car lots.....	@ 72	Home trade, pr. shak.....	35 50 @ 35 75
Powdered, do.....	@ 72	STEEL.	
Concentrated, do.....	@ 72	English, do.....	@ 20
COPPER.		Oanton tool.....	@ 8 1/2
Bolt.....	23 @	Shk. Diam. tool.....	8 1/2 @
Sheeting.....	23 @	Pick & Hammer.....	6 1/2 @
Ingot, jobbing.....	@ 20	Machinery.....	4 @
Dn, wholesale.....	15 @	Too Calc.....	@ 4 1/2
IRON.		PIG TIN.	
Bar, base.....	@ 24	Spot @ B.....	23 @ 23 1/2
Norway, base.....	@ 48	OCAL.	
PIG IRON.		Spot FROM YARD—PER TON.	
Eglington @ ton.....	23 50 @	Wellington.....	\$8 00
Glenbrook @ ton.....	22 50 @	Oreka.....	7 50
Am. Soft, No. 1.....	@ 22	Nashua.....	7 25
Obata No. 1.....	22 50 @	Gilman.....	7 75
Puget Sound.....	22 50 @	Seattle.....	7 00
Shots Lane White.....	22 50 @	Oons Bay.....	6 00
Langston.....	22 50 @	James.....	6 15
Gartherrrie.....	22 50 @	Egg, bard.....	12 00
Barrow.....	22 50 @	Wallend.....	7 00
Carroll.....	@ 22	Scotch Split.....	7 75
LEAD.		Egg, bard.....	12 00
Flg.....	@ 4	West Hardley.....	7 25
Bar.....	@ 4 1/2	TO LOAD—PER TON.	
Pipe.....	@ 4 1/2	Australian.....	6 50 @
SHORT.		Liverpool Steam.....	7 00 @
Drop, sizes smaller than B.....	\$1 95	Scotch Split.....	7 75
Do do, B and larger sizes.....	2 10	Oordiff.....	7 50 @
Do do, bag of 25 lbs.....	2 10	Lehigh Lump.....	17 00 @
Do do, bag of 25 lbs.....	2 10	Oumberland.....	9 00 @
Do do, bag of 25 lbs.....	2 10	Egg, bard.....	12 00
Do do, bag of 25 lbs.....	2 10	West Hardley.....	7 25
Do do, bag of 25 lbs.....	2 10	Oumberland.....	9 00 @

Board Sales of Mining Stocks.

S. F. Stock Board.

THURSDAY, June 28, 1894.

9:30 A. M. SESSION.	
400 Alta.....	130 250 Mexican.....
100 Andes.....	310 50.....
200 Best & Belcher.....	340 100 Ophir.....
100.....	330 100.....
100 Challenge.....	320 150 Overman.....
500 Con. Cal. & Va.....	2 65 50 Potot.....
100 Crown Point.....	2 70 100 Sag.....
100 Crown Point.....	2 70 100 Sag.....
100 H & N.....	550 200 Union.....
500 Justice.....	100.....
2:30 P. M. SESSION.	
100 Andes.....	420 300.....
450.....	410 100 Mexican.....
100 Belcher.....	590 100.....
200 B & B.....	390 100 Ophir.....
500 C. & Va.....	2 80 200 Sierra Nevada.....
25 Challenge.....	300 50.....
50 Confidence.....	800 300 Savage.....
250 Crown Point.....	540 100.....
500 C. & Va.....	2 80 200 Sierra Nevada.....
50 Chollar.....	320 100 Egg Belcher.....
200 G. & O.....	530 300 Yellow Jacket.....
200 H & N.....	530.....

New Branch Office.

Fraser & Chalmers have established a new branch office at Denver, Colorado—527 Seventeenth street, opposite the Denver Club, and one square from Brown's Palace Hotel. It will be in charge of Mr. H. K. Ayres, who has been connected with the house at home and abroad for many years, and has had an extensive experience in important problems involving metallurgical and power plant. Visitors in Denver are invited to call at this office and make use of it in matters of correspondence, reference to periodical files, and other conveniences.

MINING SHAREHOLDERS' DIRECTORY.

COMPILERS: FRANK THURSTON, FRANK ANDROS, AND OTHERS. S. F. JOURNAL.

ASSESSMENTS.

COMPANY AND LOCATION.	No.	AMT.	LEVIED.	DELINQ. TAND SALE.	SECRETARY.
A & M M Co, California.....	15.....	20.....	May 3, June 11, July 2.....	F M Husted, 531 Oallforola	
Alta M Co, Nev.....	46.....	100.....	May 14, June 19, July 10.....	J E Jacobs, 309 Montgomery	
Bulwer Conr M Co, Cal.....	2.....	50.....	May 24, June 24, July 27.....	L Osborn, 8 S Montgomery	
Conlon G M Co, C.....	12.....	50.....	May 11, June 19, July 12.....	C E Elliott, 309 Montgomery	
Con New York M Co, Nev.....	9.....	6.....	May 17, June 21, July 9.....	J F Helling, 113 Crocker Bldg	
Oons St, Gohard M Co, Cal.....	8.....	20.....	June 8, July 10, July 31.....	Otto Tun Euden, 530 California	
Eschep M Co, Cal.....	14.....	100.....	June 14, July 4.....	J J Lynch, 320 Sansone	
Evening Star, California.....	9.....	100.....	May 9, June 11, July 3.....	Ang Waterman, 399 Montgomery	
Knotuck Oons M Co, Cal.....	50.....	250.....	June 12, July 17, Aug 7.....	O E Elliott, 79 Nevada Block	
Mexican G & S M Co, Nev.....	16.....	100.....	May 31, July 5, July 31.....	A K Durbow, 69 Nevada Block	
Ocidental Con M Co, Nevada.....	14.....	100.....	June 12, July 14, Aug 6.....	E B Holmes, 3 S Montgomery	
Reg Selcher & Alden, Nev.....	10.....	200.....	May 2, June 11, July 9.....	J W Fox, 310 Pine	
Silver Kug M Co, Arizona.....	11.....	10.....	May 15, June 25, July 16.....	A Halsey, 325 Montgomery	
8 Eureka M Co, California.....	49.....	150.....	June 20, July 25, Aug 15.....	O A Harvey, 309 Montgomery	
Union Cons M Co, Nev.....	11.....	40.....	May 14, June 20, July 16.....	C F Bonard, 26 O Farrell	
Virginia Cons. Cal.....					

MEETINGS.

COMPANY AND LOCATION.	MEETING.	SECRETARY AND OFFICE IN S. F.	DATE.
Best & Belcher.....	Annual.....	M Taffe.....	July 9
N rib Star M Co, Cal.....	Special.....	D A Jenloga.....	July 10

Mining Share Market.

SAN FRANCISCO, June 28, 1894.

The general verdict on and off the street is that the main stocks are worth more than current quotations would indicate. It is not unusual to find the stock sales figure a poor indication of the mine value. The general depression and next week's holiday aided in hearing the market. Sanguine operators think the disbursement of July dividends will ease money matters to the extent of increasing active purchases. The swing of the pendulum has now oscillated from Con. Cal. and Va. at \$9 to \$2.50, with the mine looking better when the stock is \$2.50 than it did when it sold at \$9.

Of the mining outlook on the Comstock, Dan De Quille, in the S. L. Tribune, says:

As regards the mining situation on the Comstock, it is at several points much more favorable than it was several months ago. A really large and valuable body of ore is fast being developed at and below the 1650 level of the Consolidated California and Virginia mine. On the 1650 level there is a width of about six feet of solid black sulphure ore assaying well up into the hundreds at some points, and averaging about \$100 a ton. This rich ore still continues at a depth of twenty-eight feet below the 1650 level, where a crosscut shows it to be twelve feet in width. At the 1700 level a crosscut is just entering the ore body, the east side of which it has penetrated some two feet, showing ore that assays \$30 a ton. The indications are that the ore vein will be found to be much wider at this point than in any of the openings above. It is also likely to be found richer than at any point above, as instead of beginning in ore of low-grade material, it starts at once in good paying ore. The ore is being worked at the Morgan mill on the Colorado river, to which several hundred tons have already been shipped.

This little bonanza, which yields a large per cent in gold, is now the principal hope of our people. Had we half a dozen such along the Comstock lode, all would be well with us for many months, as most of our idle miners would then be able to find employment. Promising indications are being found at several points, and almost any day we may hear of something of value being found. I have great hope of a find being made in the exploring drifts that are being run to the westward in the Ophir on the level of the old Central tunnel. In that direction goodly deposits of rich gold-bearing quartz are liable to be found. It will be recalled that the Rowe vein yielded several hundred thousand dollars in gold. It was a feeder of the Ophir, and no doubt there are other feeders not yet found, as in the early days attention was given to nothing but the main bonanza, which was followed to the 500 level, where it pinched out. Parallel veins in the shape of feeders were not looked for, and had they been, would not have been easily found on the surface, as the slope of the mountain is covered to a considerable depth with debris from above.

Other leading mines of the Comstock are yielding more or less ore, and are diligently prospecting in the hope of finding something that will enable them to do better than barely keep alive, as at present. But very little can now be done with mines that are purely silver bearing. There is now more truth than ever before in the old Mexican saying that "it takes a gold mine to work a silver mine."

The Enterprise says: The Consolidated California and Virginia letter which follows, shows that the face of the west crosscut on the 1700 level is in \$30 ore. There can be no gainsaying the fact that a large and rich body of ore is that which has recently been discovered. The facts known show that the body has already been marked out, and that the ore assays from \$30 to \$500 per ton. The opinion of mining men is that the ore extends both above and below the points at which it has been reached, and it is generally thought that the ore above the 1650 level is of greater richness than any taken from the new bonanza. However this may be, enough is known to assure the fact that men will be put to work, and at least a partial revival of the former prosperity of the Comstock will take place.

James K. Lynch, assignee of Robert Sherwood, has sued the Bodie Tunnel and Mining Company to recover \$16,723.86 upon a promissory note dated June 30, 1890, with interest thereon from April 30, 1894.

In the suit of Wetmore against Barrett & Co., stock brokers, the Supreme Court has confirmed its former opinion in the case of Cashman vs. Root, practically deciding that dealings in stocks on a margin are illegal, the judgment in favor of Wetmore for money given to the defendants to buy stock on a margin being affirmed. It is thought that the defendants will take the question up to the Supreme Court of the United States.

In the suit of M. W. Fox vs. The Hale & Norcross, wherein \$1,250,000 is involved, there is a new phase involved, the case having been transferred from Department 2 to the Supreme Court in banc; this is interpreted to mean that Justices McFarland, Fitzgerald and De Haven have not been able to come to an agreement.

William Megginson, of Columbus, Ohio, has brought suit in the United States Court against the Lone Jack Mining Company for a claim in Slug Gulch, El Dorado county, which he says is his property. It is valued at \$10,000.

At the annual meeting of the stockholders of the West Con. Va. & Cal. Mining Company 93,056 shares were represented. The following officers

were elected: M. W. Fox, president; G. P. Thurston, vice-president, and A. D. Carvill, P. J. Lain and R. Collins, directors. P. H. Andros was re-elected secretary, and H. W. Tangerman superintendent. The secretary's financial statement showed a balance of \$9121.80 in the credit side of the ledger.

The following illustrates the changes of the week:

MINES.	21	28
Utah.....	\$ 5	.....
Sierra Nevada.....	61 1/2	56
Union.....	37	31
Mexican.....	78	58
Ophir.....	1 95	1 70
Consolidated California and Virginia.....	3 10	2 80
Best & Belcher.....	1 05	99
Gould & Curry.....	40	34
Savage.....	52	59
Hale & Norcross.....	26	23
Chollar.....	46	40
Potosi.....	15	.....
Bullion.....	.....	.....
Exchequer.....	.....	.....
Alps.....	89	.....
Consolidated.....	80	86
Yellow Jacket.....	40	40
Crown Point.....	50	54
Belcher.....	56	59
Overman.....	12	14
Justice.....	13	10
Alta Consolidated.....	20	18
Consolidated New York.....	35	32
Challenge.....	76	.....
Bodie.....	41	42
Andes.....	.....	.....

Patents Issued to Pacific Coast Inventors.

Reported by Dewey & Co., Pioneer Patent Solicitors for Pacific Coast, 220 Market Street.

FOR THE WEEK ENDING JUNE 19, 1894.

521,491.—OIL-ON FAUCET—G. W. Arper, Oakland, Cal.
521,534.—CARPET FASTENER—P. Coorick, Seattle, Wash.
521,640.—FOLDING CRATE—A. W. Coate, Ukiah, Cal.
521,748.—TOY BANK—J. W. Coate, A. S. Page, S. F.
521,642.—LAMP EXTINGUISHER—O. W. Cottrell, Wash.
521,766.—PIPE—O. S. Hamill, Los Angeles, Cal.
521,541.—ROTARY ENGINE—H. D. Holland, S. F.
521,472.—WINDOW—F. M. Mabney, S. F.
521,767.—TURNS—J. McNamara, Seattle, Wash.
521,663.—ORE GRINDER—N. C. Moore, Newhall, Cal.
521,545.—CAR COUPLING—W. C. Nelson, Santa Rosa, Cal.
521,768.—POWER APPARATUS—A. S. Page, S. F.
521,551.—GAS ENGINE STARTER—J. W. Raymond, S. F.
521,628.—OABINET—Bertha S. Wilkins, Los Angeles, Cal.

NOTE.—Copies of U. S. and Foreign patents furnished by Dewey & Co. in the shortest time possible by mail or telegraphic order. American and Foreign patents obtained, and general patent business for Pacific Coast inventors transacted with perfect security, at reasonable rates, and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

LANTERN OR LAMP EXTINGUISHER.—Charles W. Cottrell, Washoul, Wash. No. 521,642. The object of this invention is to provide an extinguisher which is readily attached to lamps or lanterns. It consists of an air tube of a diameter which will allow it to pass through one of the apertures in the foraminous ventilator disk bent laterally at its upper end, and provided at its outer end with an air bulb and an attaching device secured to the tube between the bulb and the bend. The pipe has its inner end open and in proximity to the wick top, so that when the air bulb is compressed a jet of air will be forced through the tube to extinguish the flame.

POWER STORAGE APPARATUS.—Albert G. Page, assignor of one twenty-fourth to Frank H. Johnson, San Francisco, No. 521,768. The object of this invention is to provide an apparatus through which power is transmitted from any suitable source, and by which said power is stored and utilized to increase the effective force which is applied to the driven machinery. It consists of independent vertical shafts standing in line and movable with relation to each other, mechanism through which power is applied to rotate the uppermost of the shafts, a disk secured to the lower end of each of the shafts, and vertical lever rods crossing each other spirally having their ends loosely connected with the disks and horizontally disposed weighted lever arms connected with these spirally disposed rods, so that the weights are raised when the rods are twisted by the rotation of the vertical shaft, but will fall as soon as the speed of this shaft is slackened, and will thereby apply a certain amount of power by reason of the weights, to continue the motion of the shaft.

GEO. E. BELMOR,

OF THE BELMOR BOILER WORKS,
Has Removed from 210 Mission St. to 52, 54 and 56 Bluxome St., bet. 4th and 5th.
(To the old H. W. Rice Machine Works.)
FOR BOILERS, DREDGING BUCKETS AND SHEET IRON WORK, CORRESPOND.

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